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. . . a specially tailored protective lacquer has been developed to protect the engines of the "Flying Aces," planes of the American Export Airlines which fly a 11,500-mile, four-continent route. The lacquer must provide protection against tropical rains, hailstones, salt water, de-icing fluid, high octane gas and similar fluids.

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. . . sawdust, as a cleaning compound for removing dirt and oil from aircraft parts after magnetic inspection and prior to organic or inorganic treatment, is saving many hours and critical materials in aircraft plants.

. . . although the production of acetoacetanilide, used in the manufacture of organic yellow pigments, recently reached the rate of 60,000 pounds a month, the rate is expected to increase 80,000 pounds a month in July.

. . . since the beginning of the war the United States has turned out 171,257 planes. Output between January, 1940, and March, 1944, expanded 3,400 per cent in number and 6,800 per cent in airframe weight. U. S. plane production is now at a rate greater than 4 to 1 in comparison with Germany's, and Japan's production of combat planes is about 13 per cent that of U. S. output.

Painting and Baking Operations at Crosley

By F. B. KNIGHT
Plant Engineer, The Crosley Corporation, Cincinnati, Ohio

EXPEDITIOUS painting and baking of approximately 2,000 different parts that are used in war products now being manufactured by The Crosley Corporation have been made possible by the recent installation of a modern, streamlined paint spray and baking operation layout in the company's main plant in Cincinnati, Ohio.

One of the most difficult problems to be solved was the design of a universal rack that would accommodate all of the 2,000 different parts, which

The operators shown here are engaged in the preliminary racking of small parts normally handled in trays.

A tray of unfinished parts is placed on the universal rack, the design of which has simplified painting and baking operations.

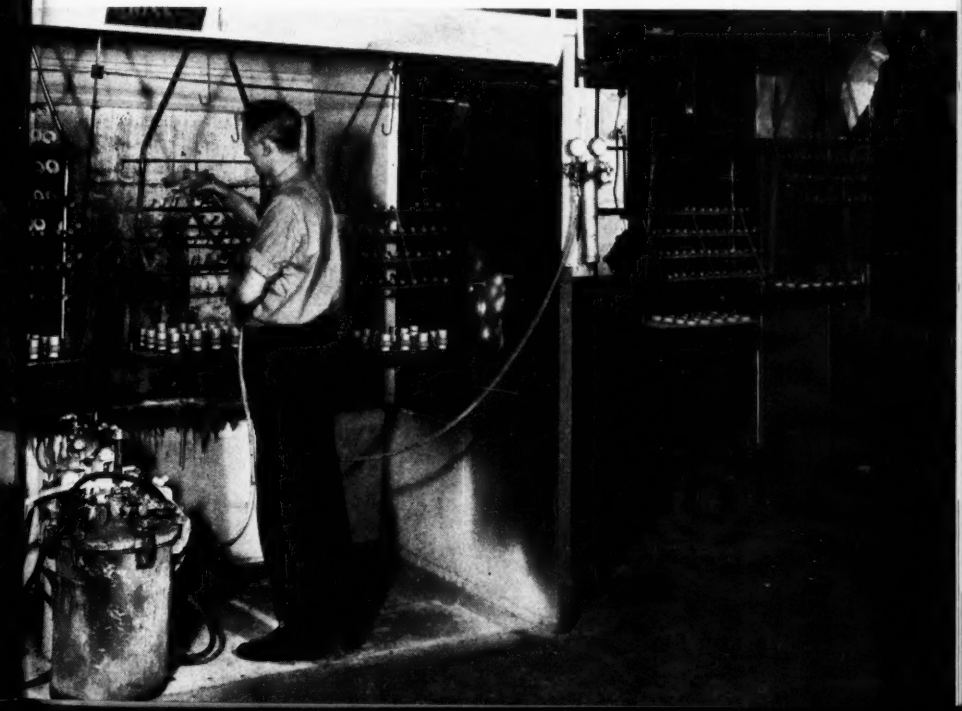
are of widely-varying shapes and sizes.

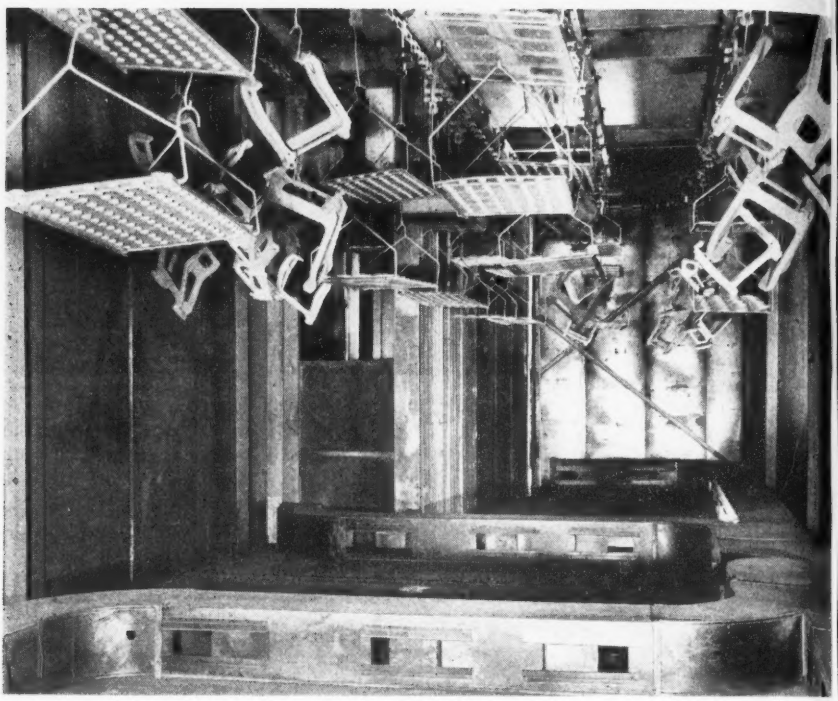
In the new department are three Binks water-wash spray booths, each 10 feet square; two Newcomb-David wash spray booths, each eight feet square; an R. C. Mahon direct-fired oven, and a variable speed chain conveyor.

The floor layout is so arranged that the conveyor passes through two of the Binks booths and directly into the oven. The other three booths are hand-spray booths and the work is placed on trays which, in turn, are hung on the conveyor before it enters the oven.

Through a double-door on the side of the oven a truck with special parts may enter the oven for special

As the racks, suspended from the moving conveyor, are carried through the spray booth, small parts are spray painted as shown here.





This view shows the interior of the baking oven now in use in the Crosley paint spray and making department.

paints or processes. The baking time in the oven may be varied from 45 minutes to two and one-quarter hours by changing the chain speed. The baking temperature can be varied from 100 to 350 degrees Fahrenheit.

Present operations call for a baking time of 45 minutes at a temperature of approximately 290 degrees. At this speed, spraying time in each of the two conveyorized booths is about two and one-quarter minutes. Ordinarily, two men work in each of the 10-foot booths.

At one end of the department, the conveyor forms a loop, at which point the racked, unpainted work is put on the conveyor and the painted and baked work is removed. Between the oven and the unloading station, there is an 80-foot section of conveyor chain, which permits proper cooling of the work.

The loading, unloading and racking operations are performed in a space approximately 20 by 24 feet in size. Both finished and unfinished stock is carried to this area by hand truck.

The direct-fired oven is approximately 40 feet long, 14 feet wide and 10½ feet high, and is built of four-inch insulated oven paneling. The heating and control equipment are separate from the oven and consist of a surface combustion LP-1000 heater, Bristol and Minneapolis-Honeywell controls, and an exhaust and supply fan. A slightly positive pressure is

THIS ALVEY-FERGUSON Duo-Cleaning Equipment was built in the form of a "Siamese Twin"—with the Rotary Drum Machine and Wire Mesh Conveyor Machine built side-by-side in the same housing and using the same set of pumps and the same supply tank.

The small parts are conveyed to the machine in metal boxes covered with cutting oil. The small parts are cleaned in the rotary drum machine; the metal box in the wire mesh conveyor machine. The parts and box are thoro-cleaned as they "race" through the equipment—which is synchronized so that the box always comes out first, in plenty of time to carry the same parts on to their destination.

The loading hopper on the rotary drum side can be operated from either end of the machine.

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CONVEYING MACHINERY A-F

Alvey-Ferguson

The operator is unloading large finished parts from the rack.

●

Preparation of Metal for Porcelain Enameling. A technical bulletin which comprises a set of directions for the cleaning and pickling of metal prior to porcelain enameling, both as to the preparation of standard chemical solutions for the purpose and the control of such solutions in use, and also as to the actual cleaning and pickling operations, has been issued by the Joint Committee of the Frit and Porcelain Enameling Sheet Manufacturers, 19 W. 44th St., New York 18, N. Y.

Subjects discussed include drawing compounds, pre-cleaning tank, pickling baskets, alkaline cleaning, cleaner rinse, acid rinse, nickel dip, nickel rinse tank, testing of cleaner solution, testing of sulfuric acid pickle bath, iron content, testing of neutralizer solution and preparation of standard solutions and reagents. Copy of the bulletin free upon request.

maintained in the paint spray area, the total exhaust being 54,760 c.f.m., while the fresh air supply is 56,000 c.f.m.

This fresh air supply consists of a capillary air washer with steam reheat for humidity control. The equipment is located at some distance from the paint spray department and the air enters by means of an underground duct and overheat distributing grilles.

Five different types of finish are being used at present. They are: wrinkle finish, zinc chromate prime, iron oxide prime, enamel and lacquer. Approximately 10 different colors are used.

●

Here a rack of finished small parts is being unloaded.

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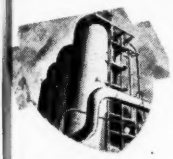

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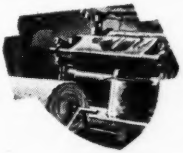

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Increasing Efficiency in Metal Finishing

By JEFFREY R. STEWART

Part I

This article is presented as a review of information on a subject which has been of outstanding interest since Pearl Harbor, and is the result of a literature search at the Library of Congress in Washington, D. C. It is intended to provide information in condensed form for those who have limited time to read the mass of scientific literature on this subject.

THE Pearl Harbor event is not only a convenient time to refer to in making a review of the ideas and methods for increasing efficiency in metal finishing, but it is also a highly important date due to the fact that many of us have been working at a much accelerated pace since that time. The writer believes that a review of scientific information should be more popular now than in previous years.

Americans who are self-reliant are that way for several reasons, one of which is the habit of keeping well informed. In the paragraphs that follow, an attempt has been made to relay to the readers, in condensed form, some of the more important items on the finishing of metals which have been discussed recently—all with the purpose of trying to keep pace with developments and, even though in a modest way, to keep the readers of PRODUCTS FINISHING as well informed as possible. In the event that the reader's desire for information is not satisfied by the rather terse discussions which follow, it is suggested that the author be consulted for further data.

Many readers of this article may be interested in a new process which has been announced for the finishing of metals. This comprises the application of an enamel which contains an induratable synthetic resin in tar oil. An organic substance, such as anthracene or any solvent boiling above 300 degrees C., is also added. Both the enamel and the metal are heated before application.

During the past six years we have also seen hot spraying introduced into the metal-finishing industry. Some men of authority in the industry, such as Dr. Henry A. Gardner, have predicted that after the war hot dipping will likewise be introduced. It is thought that such a method would call for more attention to the stability of coatings in the liquid stage. There has also been some study regarding methods of improving spray and dip-application. It has been found that beads and tears can be eliminated by the use of electrostatic fields. This aid, it is claimed, may be used in

spraying large objects such as ships, freight cars and airplanes.

The German Government has issued to all the railroads instructions which provide for the painting of steel freight cars with two base coats of red lead and top coats of various paints. However, there seems to be a wide choice of materials to be used—bitumen, synthetic resin enamel or certain lacquers. The reason why the German Government has specified that basic ground or primer coats be used is that the vehicle used in many of the new finish coats is slightly acid in nature. The use of basic primer coats tends to neutralize this condition, thus minimizing corrosion of the metal.

It has been found that aluminum or aluminum alloy cartridge cases can be protected from corrosion by a new method. The metal is faced on one or both sides with a film which is not less than 40 microns thick. This film is composed of an adherent, flameproof, high - melting - point aluminum compound. The protective film is sealed by treatment with a solution of waterglass (sodium silicate solution) or sodium dichromate. It may also be sealed by the use of a cobalt or nickel salt of a weak acid.

A series of tables has been prepared which will aid the consumer of industrial finishes who deals with fibres and metals. Moisture - transmission data of vinyl chloride-vinyl acetate copolymer coatings at various temperatures has been tabulated. Useful information is also available regarding the various methods of application and the fabrication properties and uses of many commercial coatings now on the market.

Extensive studies have been made on the subject of adhesion of lacquers to metal, and a method has been devised for testing the adhesive properties of metallic coatings. This is a step in progress which has been awaited for many years. It was found that the acid value of the alkyd resin has no relationship to the adhesion of nitrocellulose lacquer, contrary to previous assumptions. Stearic acid (0.5 per cent concentration) increases the adhesion of lacquer to steel, zinc and aluminum, and decreases the adhesion on magnesium.

Corrosion of metals under a protective coating has been a study of great interest since the war began. Measurements of current density and film resistance have been made by using cells comprising painted iron sheets and silver electrodes. The paints included were zinc oxide, zinc chromate and lead oxide paints. The silver electrode usually behaved as the anode until the paint film was perforated, and then the polarity reversed itself. Although some progress has been made on the subject of corrosion, it has been found that no entirely satisfactory activating and passivating films can be made.

An effort has been made recently to eliminate the formation of the green coloration in clear dipping lacquers used on brass and copper. It was found that phosphorus acid and its esters are the best materials to solve this problem.

Baking enamels can be made from marking-nut oil. The oil obtained from the seeds of the marking nut was extracted with a solvent, filtered and diluted with 5 per cent of turpentine. It was then brushed on and baked at 150 degrees C. for two hours. The films were hard, glossy and resistant to heat, as well as water, acids, alkali and gasoline. Alternatively, this new oil can be polymerized at approximately 150 degrees C. before being thinned or incorporated with bodied linseed oil. If the oil is subjected to continued heat treatment, it yields an oil-soluble resin which has an acid value of approximately 11.0 and an iodine value of

about 137.0.

Flame-priming has been studied extensively by various investigators, and the results of the studies and investigations have been reviewed with considerable interest. Flame-priming has been used to a greater extent recently, especially insofar as the painting of structural steel, storage tanks, dams, locks, freight cars, bombs, shells, deck plates, subway construction, airplane hangers and pipe lines is concerned. The advantages and disadvantages of this method of metal protection have been discussed by many authorities; as a result, therefore, the subject has become somewhat controversial.

The prevention of rust by the use of oil films has also been investigated. It has been found that oils of the unsaturated and unconjugated type (such as Chinawood oil and dehydrated castor oil) do not afford good rust protection when combined with red lead or zinc oxide, whereas the same pigments are satisfactory if linseed oil is used. It is assured that the change in the efficiency of various oils is related to the leafing action.

It has been found that tin plate can best be substituted for by the use of phosphatized black plate which has been lacquered. However, the most important factor is the proper selection of the lacquer to be used.

A water-resistant paint has been invented for use on iron and steel. It consists of the following:

500 lb. powdered marble
100 lb. rosin
100 lb. zinc oxide
20 lb. shellac
10 lb. wax
10 lb. linseed oil

The invention has been patented both in the United States of America and in Italy.

The finishing of aviation engines has been investigated to quite an extent by the military authorities. The parts to be painted are usually divided into three main groups, depending on the requirements and temperatures to be encountered. The first groups of airplane parts comprise the crankcase sections and the miscellaneous magnesium and aluminum parts which are not expected to reach temperatures in excess of 350 degrees F. These parts are first pre-cleaned with either hot water or an emulsifiable solution. The magnesium parts are usually given an additional alkali cleaner rinse, which is followed by a warm water rinse to remove the traces of alkali. In most instances a protective treatment follows, which consists of Dow Treatment No. 7 for the magnesium parts and a chromic acid anodizing treatment for the aluminum parts. A thin and wet translucent coating of zinc chromate primer is then applied and baked at 250 degrees F. Alkyd enamels are then applied, of which two coats are used on aluminum alloy parts and three coats for magnesium parts. The baking temperature is almost always about 250 degrees F.

The second group comprises cylinder assemblies. These are usually expected to be subjected to higher temperatures, ordinarily not in excess of 500 degrees F. The metal is degreased, bonderized, anodized and then painted. Metallizing, which is a process of spraying pure molten metal, is also used in some cases as a protective medium.

The third group, consisting of various sheet metal parts, is treated exactly the same as the crankcase parts, the minor difference being that black enamel is used in place of blue grey, unless some other special color is specified.

The present emergency has found considerable use for phosphate rustproofing (parkerized and bonderized finishes), especially insofar as small arms manufacture is concerned. Its

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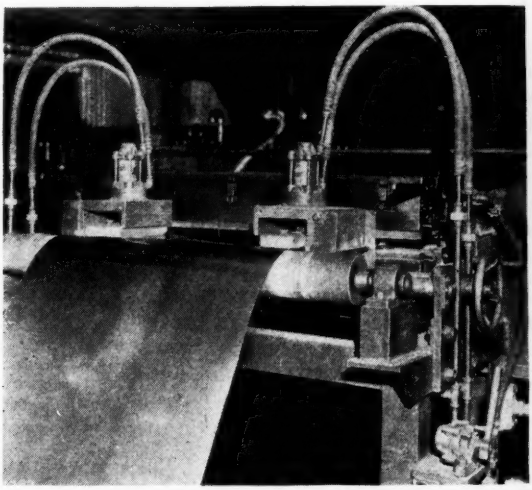
greatest use is on iron, steel and zinc objects. The primary object, according to some authorities, is either to provide an oil-absorptive surface or to change the texture of the surface in such a way that much greater adhesion results. The physical characteristics of the phosphate film, such as the thickness and crystalline structure, is usually controlled by the method of applying the solution, or by modifying or balancing the phosphate compound. Bonderized and lacquered black plate is now being extensively used in place of tin-coated steel in the manufacture of caps, crowns, cans and similar metal objects.

The adhesion of paint or enamel to metal can be increased by a new method invented by Blackmun and Mikula. The process consists of treating the metal with sodium carbonate or sodium chromate, followed by a treatment with weak nitric acid. A small amount of sodium chromate added to the alkali solution increases the efficiency considerably.

The best way to protect underwater steel is to use red lead for the undercoat and a thick coating of bituminous paint for the top coats. It is claimed that this treatment gives about six years of continuous underwater exposure in water that is similar to the kind found in the Gatineau River in Canada. No tubercles or rust formation was evident until about five years after painting; other paints used for comparison purposes failed within six months to a year after application.

(Part 2 will be published in our August issue)

Ingenious Pin-Hole Detector Devised by G-E



Pin-holes in a continuous sheet of tin plate are detected by this electronic control device. The view shows the scanning head for the pin-hole detector and the supporting stand with manually operated side guides which maintain the strip at the proper pass line by means of air-operated pressure blocks. The scanning head is ventilated by compressed air.

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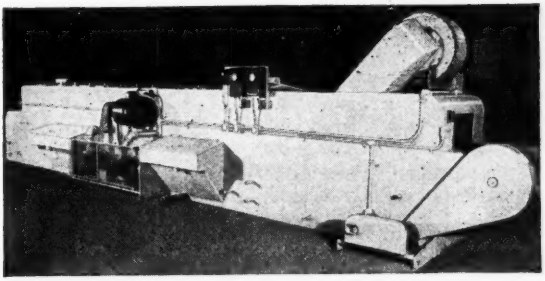

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Further Experiments in Rainbow Plating

By OLIVER P. WATTS

A GOOD solution for molybdate rainbow-plating contains 40 g./L ammonium molybdate with addition of 2 g./L NaCN as a brightener of colors. The bath temperature is 70 to 90 degrees C. Addition of ammonium carbonate as a conducting salt widens the bands of color. For variety in colors it is necessary that the deposit vary in thickness. This variation is secured by use of a thin platinum wire as anode, which is moved about near the face of the cathode, thus producing large variations in cathode current density. It is convenient to have two anodes on hand; one with only 6 mm. of Pt wire protruding from the glass tube in which it is sealed, and the other with 5 to 6 cm. of wire exposed. The latter is used for broad effects, and to speed up deposition when plating large areas. Over-plating should be avoided, since it dims the colors, as does lack of sufficient cyanide in the bath. For greatest brilliance of colors, plating should be done on highly polished metal surfaces.

Leaves, star-shaped patterns and others may be made to appear in rainbow plate by covering a portion of the cathode by a mask, such as a waterproofed leaf or a cut-out form of thin metal. After a background of color has been produced by moving the platinum anode about near the face of the cathode, the mask is removed and plating applied to the bare metal underneath with the fine platinum wire held close to the surface of the cathode.

Because of its necessary thinness, rainbow plating is suitable for indoor use only and the plate should not be subjected to hard wear. It is for the adornment of metals—not for their protection. The oldest specimen kept its brilliance for a year and a half indoors.

Nobili [1], in 1826, obtained colored rings on the anode from lead solutions. For comparison of such deposits with rainbow plating, a dilute solution of sodium hydroxide was saturated with

1 "Electro-Deposition of Metals," 6th ed., p. 4, 461-3 (1826).

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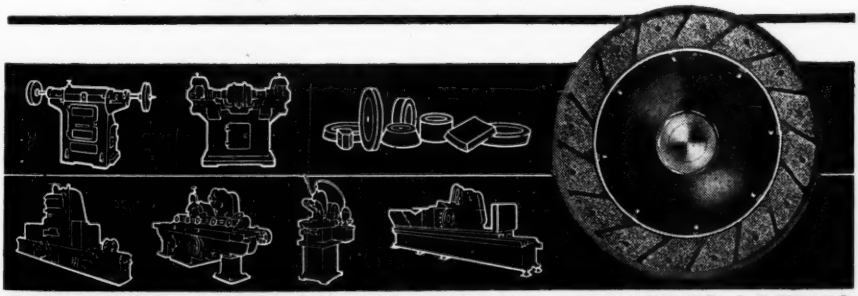

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litharge and used hot. The nickeled or silvered copper sheet was made anode, while the small copper-wire cathode was moved about next the face of the anode to control the distribution of colors. The results were similar to the cathode effects from the molybdate solution. The plumbate bath has the disadvantage that the metal to be plated must be insoluble as anode, and the deposition of lead onto the fine platinum wire cathode is a nuisance. Furthermore, the masks used to produce special figures in the plate must make a closer fit than in the molybdate bath.

It is believed that the colors in rainbow plating, either from the molybdate or plumbate bath, are not due to the color of the deposit, but, as in soap bubbles, to interference of light reflected at the two surfaces of a film of extreme and varying thinness. The real color of these deposits is seen only after plating for many minutes, when the anode in the plumbate solution becomes covered with the familiar chocolate-brown coating of lead peroxide, and the cathode in the molybdate solution loses its bright colors and looks like that bugbear of the plater, a "burned" deposit.

To test the effect of the color of the original metal on the the color of the plating, polished sheets of silver, brass and copper were in turn plated in the same molybdate bath. On silver the rainbow colors were purple, green and red, with green predominating; on brass, purple, green, yellow and a little red; on copper, a little yellow, green and much red..

All attempts to secure rainbow plating from commercial solutions for the deposition of copper, nickel, brass and silver, hot or cold, concentrated or dilute, have been unsatisfactory. In the successful rainbow solutions, the molybdate and plumbate, the metal is a part of the anion. Among the many solutions tried for rainbow plating were sodium or ammonium manganate, tungstate, vanadate and zincate. Though similar in constitution to the molybdates and plumbates, these solutions failed to yield rainbow plate. The molybdate and plumbate solutions are unique. Over 165 specimens of rainbow plate were made in these experiments.

(Paper presented at the Eighty-Fifth Meeting of the Electrochemical Society, Inc., at Milwaukee, Wisconsin, and reproduced here with the Society's permission.)

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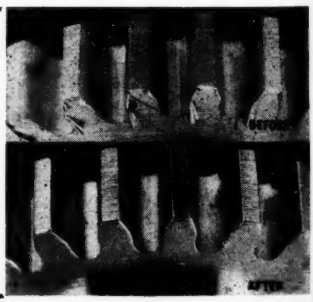

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The Chemistry of Electroplating

By Dr. C. B. F. Young, Consultant

Part 10

IN the preceding article some reactions were illustrated, and then the subjects of sodium and potassium salts were discussed. At present, an important chemical family is treated, while in the latter part the periodic law of the elements is developed and illustrated. The latter is important as it catalogs the elements in a few families, thereby aiding the student in becoming familiar with a great many elements by knowing the properties of a few.

Many times the elements come in groups so that they can be classified into families where there are definite relationships between the elements of a family. The halogen family a good example of this. There are four members to this group and all have similar properties. In the latter part of this article the reasons why such similarities exist will be studied. This family is composed of four members, fluorine, chlorine, bromine and iodine, all of which are non-metals and form negative ions in solution. Each has a valence of one. The name of this family, "Halogen," means salt—former for the simple reason that they unite with the metals to produce salt.

Hypochlorous acid is a powerful oxidizing agent. It is formed by dissolving chlorine in water.

$$Cl_2 + H_2O = HCl + HOCl$$

Litmus paper turns red in this solution and is then bleached by the action of the compound. If HCl is added to the solution, the following reaction is obtained.

$$HCl + HOCl \rightleftharpoons H_2O + Cl_2$$

Hypochlorous acid decomposes in sunlight.

$$2HOCl = 2HCl + O_2$$

Hypochlorous acid is a powerful oxidizing agent as shown by the equation below:

$$H_2S + HOCl = H_2O + HCl + S$$

It will also oxidize sulfurous acid to sulfuric acid.

$$H_2SO_3 + HOCl = H_2SO_4 + HCl$$

Hypochlorous acid will oxidize iodine to iodic acid as follows:

$$5HClO + I_2 + H_2O = 5HCl + 2HClO_3$$

One of the best ways of preparing this material is by dissolving chlorine in water.

When hypochlorous acid is neutral-

ized salts are produced which are called hypochlorites. Sodium hypochlorite, NaOCl, sometime called Javelle water, is made by passing clorine into sodium hydroxide:

$$NaOH + HOCl = H_2O + NaOCl,$$

the HOCl being formed by one of the methods above. The complete reaction for this would be

$$Cl_2 + 2NaOH = NaOCl + NaCl + H_2O$$

The hypochlorites are unstable compounds. They will oxidize into chlorates if allowed to stand or are heated. Thus

$$3NaOCl = 2NaCl + NaClO_3$$

If chlorine is allowed to react with lime in the dry state, bleaching powders result according to the equation following:

$$Ca(OH)_2 + HOCl = CaOCl_2 + 2H_2O$$

If bleaching powders are acidified, the following reaction takes place

$$CaOCl_2 + H_2SO_4 = CaSO_4 + HCl + HOCl$$

$$HCl + HOCl \rightleftharpoons H_2O + Cl_2$$

Chloric acid is made by the action of dilute sulfuric acid on barium chlorate:

$$Ba(ClO_3)_2 + H_2SO_4 = BaSO_4 + 2HClO_3$$

One of the most important chlorates is potassium chlorate, $KClO_3$. This is formed by passing chlorine into a solution of hot potassium hydroxide..

$$3Cl_2 + 6KOH = KClO_3 + 5KCl + 3H_2O$$

Bleaching of materials generally depends upon the oxidation of the same. Inorganic materials which are colored generally can be made colorless by bleaching with oxygen. It so happens that nascent oxygen (O) will oxidize or bleach much faster than O_2. Nascent oxygen is obtained from hypochlorous acid after this material decomposes as shown below:

$$HOCl = HCl + O$$

The nascent oxygen thus produced oxidizes or bleaches the materials. Bleaching powders can be used for this reaction as shown below:

$$CaCl(OCl) + CO_2 + H_2O = CaCO_3 + HOCl + HCl$$
$$HOCl = HCl + O$$

The carbon dioxide used in the above equation comes from the atmosphere.

Potassium perchlorate is a very strong oxidizing agent and can be formed by heating potassium chlorate:

$$4KClO_3 = 3KClO_4 + KCl$$

Bromine can be prepared electrolytically. Any soluble bromide upon electrolysis will produce bromine. Bromine may also be displaced from bromides by the action of chlorine.

$$2KBr + Cl_2 = Br_2 + 2KCl$$

It may also be prepared by heating potassium bromide and manganese dioxide with concentrated sulfuric acid.

$$2KBr + MnO_2 + 3H_2SO_4 = 2KHSO_4 + MnSO_4 + Br_2 + 2H_2O$$

Bromine is a deep red brown liquid which has a very low boiling point. Therefore, the material evaporates readily. The element has a very disagreeable odor and will attack the skin tissues. It is moderately soluble in water but is more soluble in alcohol, ether, and carbon disulfide.

Hydrogen bromide may be prepared by the direct combination of

hydrogen and bromine.

$$H_2 + Br_2 = 2HBr$$

Hot platinum gauze acts as a catalyst. It may also be prepared by the reaction of phosphoric acid and bromide.

$$NaBr + H_3PO_4 = HBr + NaH_2PO_4$$

Hydrogen bromide is a colorless gas with a rather pungent odor and has an irritating effect on the nostrils. It is quite soluble in water and ionizes to produce hydrogen ions and bromide ions. Being a typical acid, it reacts with metals, metal oxides, and bases readily. It will precipitate silver from solution as follows:

$$AgNO_3 + HBr = AgBr\downarrow + HNO_3$$

The salts of hydrobromic acids are called bromides. Thus, NaBr is sodium bromide. All bromides are soluble except those of silver, lead, and mercury.

Iodine is a gray black solid and if heated forms a violet-colored vapor. One peculiarity of this element is the fact that when heated, it passes from the solid to the vapor state without going into the liquid state. This is known as sublimation. Iodine is slightly soluble in water, very soluble alcohol, carbon disulfide and ether. It can be prepared as follows:

$$2NaI + MnO_2 + 3H_2SO_4 = 2NaHSO_4 + MnSO_4 + 2H_2O + I_2$$

It can also be prepared by displacement with chlorine or bromine.

$$2NaI + Cl_2 = 2NaCl + I_2$$
$$2NaI + Br_2 = 2NaBr + I_2$$

If a small amount of iodine is brought into contact with a starch solution, a deep blue color is produced. This is used as a test for iodine.

Hydrodic acid (HI) may be prepared in a manner similar to hydrobromic acid:

$$KI + H_3PO_4 = HI + KH_2PO_4$$

It can also be prepared as follows:

$$2P + 3I_2 + 6H_2O = 2H_3PO_3 + 6HI$$

The material is a colorless gas and is quite soluble in water, producing hydrogen and iodine ions. It is a strong acid and has the usual reactions. With the salts of silver, lead, and mercury a precipitate is produced. This means, of course, that silver, lead and mercuric iodides are insoluble in aqueous solutions.

The remaining member of this group, fluorine, is the most active and, therefore, very hard to prepare in the native state. Hydrogen fluoride is prepared as follows:

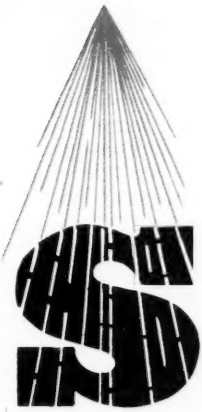
$$CaF_2 + H_2SO_4 = CaSO_4 + H_2F_2$$

Hydrofluoric acid is important because it will react with silica and silicates. Common glass is a mixture of sodium and calcium silicates and silicon dioxide, and hydrofluoric acid will dissolve these materials. Therefore, it is essential that the material be stored in rubber or paraffin bottles. The action of this acid on glass can be represented by three equations:

1. $SiO_2 + 2H_2F_2 = SiF_4 + 2H_2O$
2. $Na_2SiO_3 + 3H_2F_2 = SiF_4 + 3H_2O + Na_2F_2$
3. $CaSiO_3 + 3H_2F_2 = SiF_4 + 3H_0 + CaF_2$

There are many other compounds of fluorine but as they are not too important they are not discussed here.

The halogens, although being nonmetals, have an order of activity the same as the metals. Thus, one finds that fluorine is the most active, chlorine next, bromine next and iodine last. They can be arranged as follows: F first, then Cl, Br, I. From



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this arrangement it can be seen that bromine would displace iodine from its compounds and chlorine will in its turn displace bromine and flourine will displace chlorine. This may be called the order of activity of the halogen family.

Previously the fact was mentioned that certain elements are similar to each other and fall into groups or families. For instance, the family which was discussed earlier in this article was composed of fluorine, bromine and iodine. This is known as the halogen group. In a family one generally thinks of brothers or sisters, as the case may be, favoring each other in looks and also in action. It became very evident to many scientists working with the elements that certain elements were similar to each other. About the year 1865 Newland observed that if he made a classification of the elements, nearly every eighth element arranged according to the increased atomic weight exhibited properties of the one before it. This was also known as the law of octaves. It worked for some of the elements but not for all of them.

Mendelejeff, in 1869, made a better classification. He changed to a long period after two short periods of eight each. He placed hydrogen by itself in Group I. Next was placed helium, then in this period with helium were placed seven other elements. The first period consists of helium through fluorine. The second period consists of elements from neon to chlorine. Now neon is similar to helium in that it is an inert gas. Sodium is like lithium, and so on, until we come to the last, which is chlorine, and which is similar to fluorine.

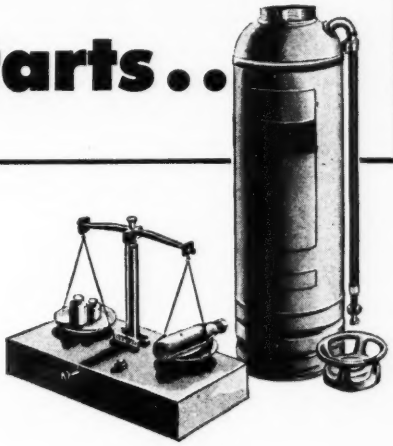
The third period contains 18 elements beginning with argon and ending with bromine. The first eight groups, argon through manganese, are placed directly under Periods I and II. This takes care of 25 elements. Then iron, cobalt, and nickel are placed to themselves in Group VIII; Group III continues by placing copper under potassium and ending with bromine, which is placed under chlorine. In this manner Groups IV and V can be obtained. At the time that Mendelejeff put forth his theory, there were many blank places occurring. He suggested that this was due to the fact that an element should be placed there which was not yet discovered. This has proved to be the case in many of these spaces. In three instances—argon and potassium, cobalt and nickel, tellurium and iodine—it has become necessary to reverse the order in which the atomic weight placed the elements so as to bring the elements into their proper family. Thus, we can see that Mendelejeff found that the properties of the elements are functions of their atomic weights. Such an arrangement of the elements is known as the periodic system and is given in the table on page 50.

The periodic system gives the chemist a general classification of the elements. Thus one is able to learn the general properties of one element, at the same time learning the general properties of possibly several other elements. Take the halogen family for instance. If one knows the properties of chlorine, some of the properties of flourine, bromine and iodine will also be known.

It is possible to predict missing elements and the properties of them. This has aided the scientist in many fields and has led to the identification of elements which would otherwise have been very hard to accomplish.

There are objections, however, to the periodic system. Hydrogen does not have a definite placing. Tellurium is heavier than iodine and, if placed in

before it starts..



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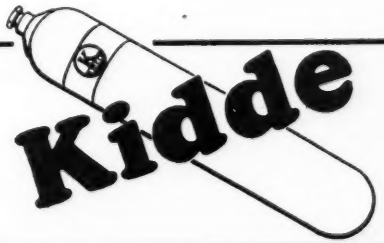

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this order, iodine will be out of its family, as would tellurium. The same holds true for cobalt and nickel, argon and potassium. No quantitative relations are stressed; only qualitative methods are obtained. Manganese should not be grouped with the halogens. And, finally, the system

PERIOD	GROUP 0	GROUP I	GROUP II	GROUP III	GROUP IV	GROUP V	GROUP VI	GROUP VII	GROUP VIII
0		1 H 1.008							
I	2 He 4.00	3 Li 6.940	4 Be 9.020	5 B 9.020	6 C 12.000	7 N 14.008	8 O 16.000	9 F 19.000	
II	10 Ne 20.20	11 Na 22.997	12 Mg 24.32	13 Al 26.97	14 Si 28.06	15 P 31.027	16 S 32.064	17 Cl 35.46	
III	18 A 39.91	19 K 39.096	20 Ca 40.07	21 Sc 45.10	22 Ti 48.1	23 V 50.96	24 Cr 52.01	25 Mn 54.93	26 Fe 55.84 / 27 Co 58.94 / 28 Ni 58.69
		29 Cu 63.57	30 Zn 65.38	31 Ga 69.72	32 Ge 72.60	33 As 74.96	34 Se 79.2	35 Br 79.92	
IV	36 Kr 82.9	37 Rb 85.44	38 Sr 87.63	39 Y 88.9	40 Zr 91.0	41 Cb 93.1	42 Mo 96.0	43 Ma ?	44 Ru 101.7 / 45 Rh 102.91 / 46 Pd 106.7
		47 Ag 107.88	48 Cd 112.41	49 In 114.8	50 Sn 118.70	51 Sb 121.77	52 Te 127.5	53 I 126.93	
V	54 Xe 130.2	55 Cs 132.81	56 Ba 137.37	57-71 Rare Earths	72 Hf 180.8	73 Ta 181.5	74 W 184.0	75 Re 186.31	76 Os 190.8 / 77 Ir 193.1 / 78 Pt 195.23
		79 Au 197.2	80 Hg 200.61	81 Tl 204.39	82 Pb 207.20	83 Bi 209.0	84 Po 210.0	85 —	
VI	86 Rn 222.	87 —	88 Ra 225.95	89 Ac 227.	90 Th 232.15	91 Pa 231.	92 U 238.17		

Periodic System Chart

Most of the above has been taken from Practical Chemistry, Black and Conant, The Macmillan Co., 1931, p. 305. In the upper left hand corner of each rectangle is the atomic number, while the symbol of the element appears in the center. Below the symbol is the atomic weight.

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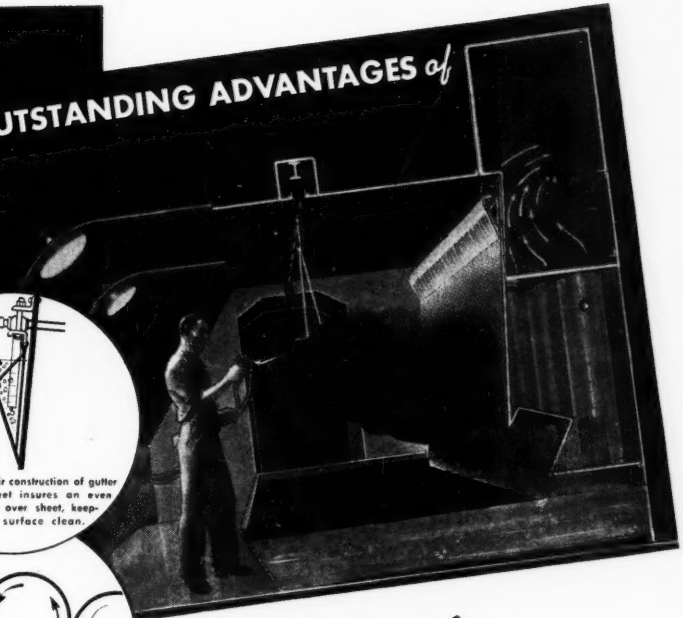

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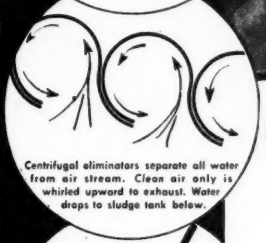

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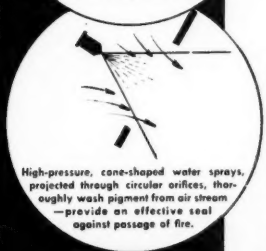

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has the serious error stressing the one valence of an element.

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He found that the wave lengths decreased in a quantitative way as the atomic weights increased. Thus, Moseley used the atomic numbers instead of the atomic weights for the classification of the elements. The atomic numbers are all whole numbers and approximately half the atomic weight and represent the number of free protons in the neucleus of the atom.

In this new classification the elements fall into nine groups. The first and second periods are short, while the third is long. It will be noticed that a long period always has three elements which are called transition elements. These always fall into Group VIII. Thus iron, cobalt, and nickel are transitious elements in the third group.

From a study of the periodic system it will be noted that the group generally indicates the valence; thus, for Group I, hydrogen has a valence of one, lithium a valence of one, and so on. Group II, beryllium, magnesium, calcium, and zinc each have a valence of two, while in Group III, aluminum has a valence of three. The first two periods, the members of Group VI and VII, are very active non-metallic elements. In regard to valence—toward oxygen the maximum valence of the different groups rises to seven, but toward hydrogen

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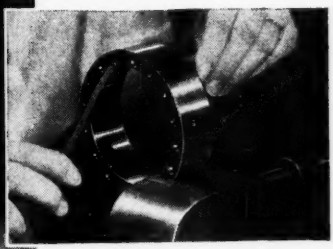

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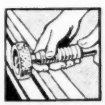

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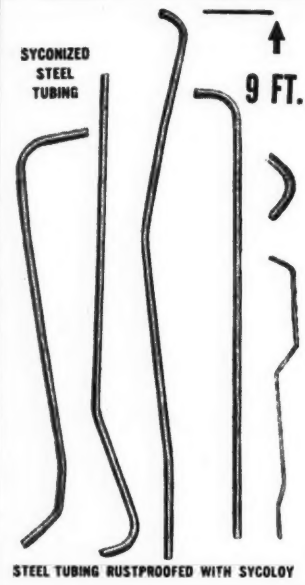
and chlorine the valence rises only to four in Group IV and then decreases to one. Groups I and II, however, are very active metals.

Thus, there is in the beginning of the period an active metal and at the end of the period an active non-metal. In the middle of a period we must have a transition element or a material which can act as a metal or a non-metal. One can say, therefore, that the most active metals in Group I and the most active non-metals are in Group VII. Metals which can act either way appear in the middle. Another way of stating this is to say that elements being most electropositive occur in Group I, while elements being most electro-negative appear in Group VII.

At this point it might be well to consider the structure of the atom. Positive and negative particles which make up the atom have been discussed, but nothing has been said to date concerning their arrangement. According to the latest views of science, an atom is composed of a definite number of electrons and protons which have a place that is undoubtedly fixed in relation to each other. The amount of electrons and protons will determine the element and its activity.

Some brilliant work has been done in this field by Louis, Langmuir, and Bohr. Their theories do not agree in every phase but basic assumptions are the same.

There are two parts to an atom, the nucleus of which contains all the protons or positive charges and some of the electrons. It is rather compact and gives weight to the atom. The second part is the shell surrounding the nucleus which is made of electrons. These electrons can revolve in a certain path around the nucleus but must stay within this limit at all times. The number of electrons in



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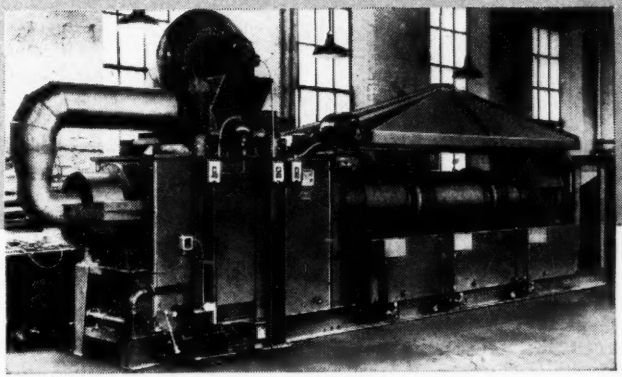


Revolving-type Colt Autosan Model 283 combines washing, rinsing and drying operations on metal parts with the continuous action necessary to mass production. It is unsurpassed for speed, thoroughness and economy.

The revolving drum is equipped with built-in spiral, which carries parts at a set rate of speed through wash and rinse operations and then through the drying section. Three tanks are regularly furnished, and can be used as washing and rinsing combinations as required. The production capacity of Autosan Model 283 ranges from 20 to 75 cubic feet per hour, depending on the work to be handled.

Colt Autosan standard models are available in various sizes and types and are designed to handle a wide variety of cleaning operations. Special models are available for unusual requirements. Colt engineering and construction assures efficient performance and long life. Write for catalog, describe your problem and we will be glad to suggest the machine best suited to meet your needs. Address: Colt's Patent Fire Arms Manufacturing Co., Autosan Division, Hartford, Connecticut.

COLT AUTOSAN
METAL PARTS CLEANING EQUIPMENT

the outer orbits is limited, and in this case all atoms containing the maximum number of electrons in the outer orbit are inert. Thus, helium is a good example.

We can assume for our work that the electrons in the outer shell revolve around the nucleus. Thus, hydrogen will contain a nucleus with one positive charge and one electron in the outer shell. Helium will contain a nucleus with two positive charges and two electrons in the outer shell. This first shell can contain only two electrons and then it is full. For this reason helium is an inert gas.

Next, lithium contains a nucleus with three positive charges and two shells. The first shell contains two electrons and is filled. The next shell contains one electron. Beryllium likewise contains four positive charges in the nucleus and four negative charges in the two shells. This continues until the second shell has eight electrons and again this element is inert because the outer electron shell is filled. After this a third shell is added.

With the electronic conception of the atom understood, it is rather simple to understand the valence of an element. For instance, let us go back to the hydrogen atom. It has one electron in one outer shell. Now, if this electron is taken away, a hydrogen ion results because if an electron is subtracted, the results will be H^+ or hydrogen with one positive charge. Thus, hydrogen loses an electron in any of its reactions. Helium, the next in order, has the outer shell filled with two electrons. It cannot gain any electrons so it is inert. Lithium has one electron in the outer shell and, therefore, can lose one electron and when it does it becomes positive.

Let us now cross over to the fluorine atom which has seven electrons in its outer shell. As stated before, this outer shell can contain a maximum of eight electrons. Now fluorine, in order to have this outer ring satisfied, can gain one electron or give up seven electrons. Ordinarily the gaining of one electron would be easier so a fluorine atom desires to do this to satisfy its outer shell. It can be seen that hydrogen can combine with fluorine because hydrogen wants to give up one electron and become positive, while flourine would like to absorb one electron and become negatime. In this way the compound HF (hydrogen fluoride) is formed.

Thus, it may be said that the valence of a metallic element is the number of electrons which it may lose in becoming a positive ion. Consequently, the valence of a nonmetallic element is the number of electrons which will be absorbed in order to complete the outer shell.

(Part 11 will be published in our August issue.)

Hand-Cut Rotary Files. The Rotary File Company has issued a profusely illustrated catalog in standard file size. Besides featuring the company's full line of standard shapes in hand-cut rotary files, together with a number of special designs, the booklet gives historical sidelights on the development of modern hand-cut rotary files and a description of the unique craftsmanship demanded in their manufacture.

All varieties of tooth cuts are shown, as well as a wide range of ingenious file shapes. The book, in effect, provides the production executive or shop foreman with a blueprint for his guidance in selecting th appropriate types of rotary files for either ordinary or extraordinary applications.

Any industrial executive or foreman may obtain a copy of the catalog without charge by writing, on his company letterhead, direct to The Rotary File Company, Stratford, Connecticut.

IMPROVES CLEANING... *Cuts Rejects*

SUN SPIRITS

Eliminates Rust . . . Cleans Castings Thoroughly

With speed so essential to our war program, delays cannot be risked in any plant. For every hold-up on the production line takes a drastic toll on vital man-power and time.

Trouble from rusting was a major problem in one plant and occurred in the cleaning of castings after machining. The operation was a difficult one at the start.

Sun mineral spirits were used, at the recommendation of a Sun Doctor of Industry. The cleaning was satisfactory in every respect . . . rusting has been checked . . . parts are cleaned thoroughly and quickly.

Rejects have been reduced, drastically, and their production increased due to the saving of material, man-power and time.

Sun Spirits has proved itself time and again in meeting the needs for the majority of cleaning jobs in any plant. It's fast, thorough, economical and safe, having the approval of the Fire Underwriters at 100° F. flash.

For more detailed information, write for your free copy of "Case Histories of Cleaning Up War Parts."

SUN OIL COMPANY · **Philadelphia 3, Pa.**
Sponsors of the Sunoco News Voice of the Air — Lowell Thomas

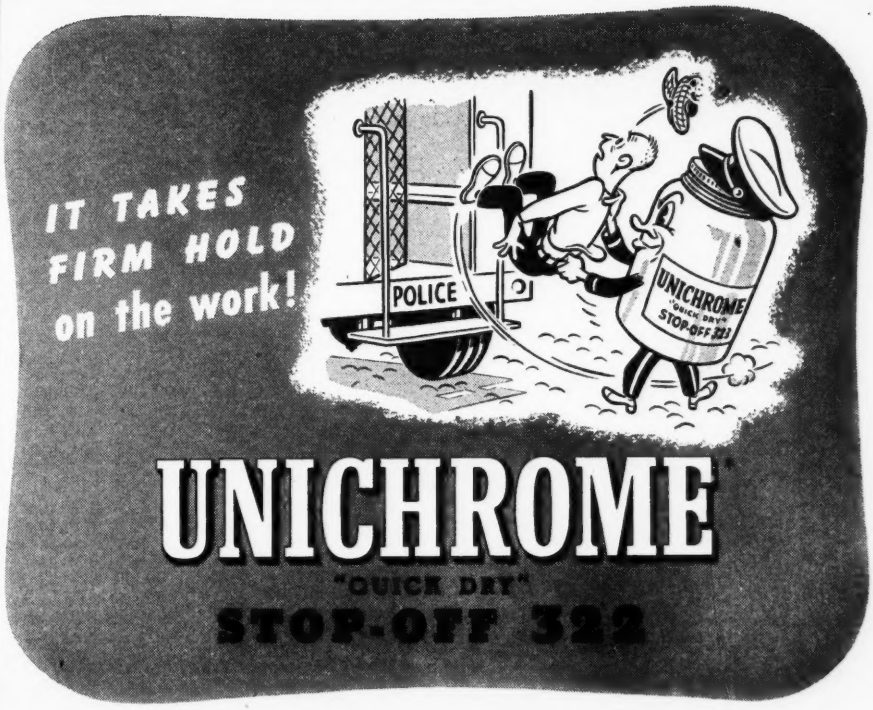
SUN INDUSTRIAL PRODUCTS *HELPING INDUSTRY HELP AMERICA*

Molten Synthetic Rubber Solves Sub-Chaser Problem

A SUCCESSFUL solution to the menace of destructive electrolytic action, which eats away the propeller shafts of Navy sub-chasers, minesweepers and other wooden vessels, has been found in the use of Thiokol synthetic rubber flame-sprayed onto steel propeller shafts by a new process, it was announced recently by the Schori Process Corporation of Long Island City, New York. Heretofore, bronze propellers fitted to steel shafts on wooden vessels produced an electrolytic action through the union of two dissimilar metals in salt water, with the result that the shaft was so eaten away within a few months that it could not stand up under the high-speed operation.

After nearly a year of experimenting with flame-sprayed plastics, which all proved too brittle and could not be easily ground for spray-gun operation, Schori engineers found that Thiokol synthetic rubber could be sprayed on the shaft while in position on the

The workman shown here is spraying a coating of Thiokol synthetic rubber on the steel propeller shaft of a sub-chaser.



UNICHROME*

"QUICK DRY" STOP-OFF 322

for better results in cyanide solutions

No need to worry about peeling or seepage when you have Unichrome Stop-Off 322 on the work. *Remember that number 322.* It marks a special lacquer formulation that—although applied at room temperature and quick-drying—holds like a bull dog even in the toughest plating solutions. It's compounded with special resins and solvents that W. P. B. is extremely reluctant to dole out. That's why we can't *always* give you immediate delivery. But Unichrome Stop-Off 322 is worth waiting for—because it gives you extra speed and convenience in handling, hairline accuracy on the work, better production per man-hour. Write for your trial order today.

* Reg. U. S. Pat. Off.

PROPERTIES

Chemical Resistance — Excellent in all plating cycles.

Application — Can be brushed or dipped—successive coating is minimized.

Drying — Dries quickly at room temperature—adheres without force drying.

Stripping — Due to extreme adherence, material is usually dissolved off after plating.

UNITED CHROMIUM, INCORPORATED

51 East 42nd St., New York 17, N. Y. • 2751 E. Jefferson Ave., Detroit 7, Mich. • Waterbury 90, Conn.

TRY THESE OTHER UNICHROME PRODUCTS

Unichrome Quick-Dry Stop-Off 322—for chromium and other work requiring a stop-off that can be peeled off after use.

Unichrome "Air Dry" Rack Coating—a rack insulation that can be dipped and dried at room temperature, for use in all plating solutions.

Unichrome Coating 202—a new rack insulation similar to "Air Dry" but which is force dried to obtain the extra adherence required in anodizing and hot, strongly alkaline solutions.

Unichrome Resist—a solid insulating material for constructing composite racks, stop-off shields, insulating gaskets, etc.

ship. The molten rubber hardens rapidly to form a firmly-bonded coating with an extremely high abrasion resistance. Since the shaft is completely protected from contact with the sea water, there is no opportunity for corrosion or pitting to set in.

This same coating can also be used advanageously to coat the interior of bronze valves on salt-water pipelines, low-temperature condenser plates and other inaccessible but vulnerable underwater portions of steel vessels, it was stated.

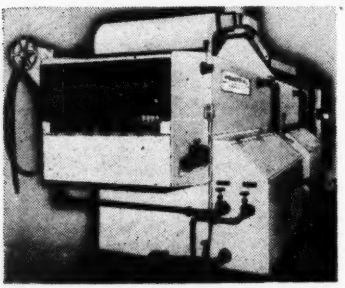
"The ABC of Luminescence" is the title of an interesting brochure prepared by The New Jersey Zinc Company, 160 Front St., New York 7, N. Y. The booklet presents a clear picture of luminescence by discussing in simple ABC language the characteristics, properties, limitations and applications of the inorganic luminescent pigments, as well as the terms applicable to this industry. A number of simple tables and charts are included to illustrate such terms as "the dark-adapted eye" and "the decay of afterglow." Copy of the booklet free upon request.

Anodes and Plating Chemicals. A booklet on anodes and plating chemicals, Bulletin AC-105, has been issued by the Hanson-Van Winkle-Munning Co., Matawan, N. J. This booklet includes data on their anodes of nickel, brass, copper, zinc, cadmium, tin, lead, silver and anodes for chromium plating.

The plating chemicals described include salts and chemicals for plating nickel, black nickel, zinc, cadmium, tin, lead and silver, also sodium cyanide. Processes covered are: H-VW-M bright cobalt nickel (high cobalt, Type 5 and 9H); Mazic bright zinc; BS zinc; Cadux cadmium; Protecto lead concentrates and B-H. lead.

Another important item included in the bulletin is the synthetic resin anode bag. A section is devoted to solution control, including data on the Jernstedt electroplating computer and a table giving the component parts in per cent by weight, of salts commonly used in electroplating. Copy free upon request.

INDUSTRIAL WASHING MACHINES



. . for fast and efficient cleaning of vital parts!

Automatic washing and cleansing have become as integral a part of production and repair as the lathe or drill press. Faster production, higher product quality and manpower economy have resulted.

INDUSTRIAL units are completely self-contained and utilize a minimum of floor space. Each is applicable to washing, cleansing, rinsing, dipping, slushing or drying operations or any combination thereof.

WRITE FOR ILLUSTRATED CATALOG

INDUSTRIAL WASHING MACHINE CORPORATION

290 BURNET ST. NEW BRUNSWICK, NEW JERSEY

A.C. HORN PRODUCTS
1897–1944

INDUSTRIAL FINISHES

Proven ability to meet ever-changing conditions is definitely indicated by forty-seven years of steady growth. Years providing a wealth of experience. Pioneers in the invention of methods and products for protection and decoration, Horn maintains three completely staffed laboratories—research, factory control and raw material control — skilled chemists and engineers at your service.

The Horn Policy

"Produce for our customer the finest finishing product for his purpose at the lowest possible cost to him."— A C Horn

Interested manufacturers are invited to enjoy the advantages provided through this experience and trained personnel, available on inquiry — address

A. C. HORN COMPANY
PRODUCTS FINISHING DIVISION
LONG ISLAND CITY 1, NEW YORK

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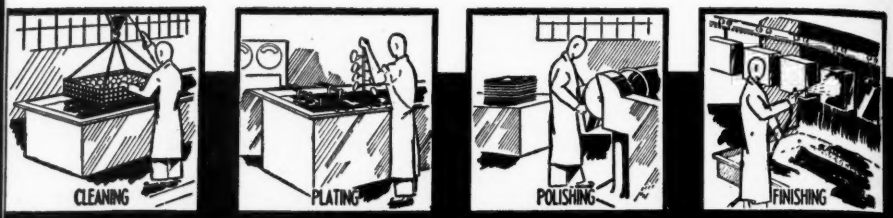


News of the Industry

Inco Official Retires

Arthur S. Shoffstall has elected to retire, under the company's retirement plan, as general manager of the Huntington Works of The International Nickel Company, Inc., effective June 30, Dr. John F. Thompson, executive vice president of the company announced recently. Mr. Shoffstall has agreed to continue in the capacity of a consultant to the head office of the company, and will continue to make his home in Huntington. He has been associated with the company since 1908.

Dr. Thompson also announced that Herman M. Brown, assistant general manager, has been made general manager and John A. Marsh, general superintendent, has been named assistant general manager. Mr. Brown has been with the International Nickel Company as assistant general manager since 1921 and previously was superintendent of the Chesapeake & Ohio Railway's Huntington Shops for 10 years. Mr. Marsh joined the Nickel Company in 1928.

P. E. I. Officers

The Porcelain Enamel Institute held its 13th Annual Meeting at Cleveland, Ohio, on June 6 and 7. The following officers were elected:

R. H. Turk, president. Mr. Turk is executive vice president of the Pemco Corporation of Baltimore, Maryland.

O. J. Heyer, vice president. Mr. Heyer is president of the Chattanooga Stamping & Enameling Company, Chattanooga, Tennessee.

Joseph T. Penton, vice president. Mr. Penton is president of the California Metal Enameling Company, Los Angeles, California.

William Hogenson, treasurer. Mr. Hogenson is president of the Chicago Vitreous Enamel Products Company, Cicero, Illinois.

Following the acceptance of the resignation of Charles S. Pearce as secretary and managing editor, Edward Mackasek was elected to this post. Mr. Mackasek was formerly executive vice president of the Beaver Enameling Company, Ellwood City, Pa. He will be located at the Institute headquarters in Washington, D. C., where he has been acting as development engineer for the last six months.

DeVilbiss Spray Painting School

The DeVilbiss Company announces that four one-week sessions in the second half of its 1944 School of Spray Painting will be devoted to the instruction of industrial finishers. With finishing men in plants everywhere hard-pressed to meet the demands of wartime jobs and eager to learn faster methods, all sessions are expected to attract large enrollments.

All regular users of DeVilbiss products will be admitted free. The same ground will be covered in sessions starting July 17, August 14, October 16 and November 13. DeVilbiss-trained spray painting experts will be in charge of classroom instruction and shop work.

To make sure of reservations, interested industrial finishers are urged to write at once to The DeVilbiss Company, Toledo 1, Ohio.

Carborundum Branch Sales Offices

Through Charles Knupfer, vice president in charge of sales, The Carborundum Company announces the opening of three new branch sales offices at Buffalo, N. Y., St. Louis, Mo., and San Francisco, Calif. Mr. Knupfer also announces the appointment of three new district sales managers—G. S. Rogers in charge of the Buffalo office, Gordon, O. Watson at St. Louis, and W. T. McCargo at San Francisco.

New Solvents Recovery Plant

Solvents Recovery Service, Inc., 1019 Broad St., N. J., announces the opening of their third plant at Thomaston, Conn., in order that they may better serve that section of the country and relieve the congested condition of their two New Jersey plants.

The Lofgren Process will be used at this plant, as in their other two plants, and for the present the plan will specialize in the recovery of solvents such as trichlorethylene and other chlorinated solvents. It will also handle hydrocarbons and certain higher boiling esters.

In losing a portion of the plant previously occupied by the Seth Thomas Clock Company, provision was made for enlarging the plant in the post-war period so that lacquer thinners, acetones, alcohols and low boiling esters can also be handled at the Thomaston plant.

Alfred B. Crane, who has represented Solvents Recovery Service, Inc., in New England for the past four years, will continue in that capacity and the new plant will be under his direct supervision.

Kearney and Faler Advanced in Detrex Engineering Staff

W. I. Tebo, chief engineer of Detrex Corporation, Detroit, Mich., has announced two appointments in the engineering department of the firm.

Thomas J. Kearney, formerly technical advisor to the director of sales, has been promoted to assistant chief engineer in charge of industrial equipment design and detailing. Mr. Kearney has been associated with the company for 10 years anod has wide experience in sales, service, production and engineering capacities. In addition to supervision of the drafting department and the general development of Detrex industrial cleaning equipment, Mr.

Thomas J. Kearney

Kearney will have charge of machine design in the preparation of customer quotations.

John A. Faler, assistant chief engineer of the company, has been appointed to take charge of extraction equipment development. Detrex Corporation has developed complete equipment for the extraction of oil from soybeans by the use of a non-inflammable solvent. Mr. Faler will co-ordinate new design and equipment development work in this division.

Cardox Appoints Staff Members

Additions to the staff of the Research Division of Cardox Corporation, 307 N. Michigan Ave., Chicago 1, Ill., are announced by Dr. Charles A. Getz, vice president in charge of research.

Dr. Winfred L. Norem has joined the organization in the capacity of chemical engineer. Dr. Norem was formerly associated with the J-M Service Corporation. He received his doctor's degree from Johns Hopkins University in 1936.

John Lee Ballard has also been appointed as chemical engineer. Mr. Ballard was formerly an engineer with Fearn Laboratories in Chicago. He is a graduate in chemical engineering of the University of Alabama.

Selas Opens Chicago Office

In order to better serve the metals and process industries of the mid-western states, Selas Corporation of America has established a new district office in downtown Chicago. The office is located at 916 S. Michigan Ave. It is complete with emergency stock, engineering reference files, operating display rooms, conference provisions, permanent service personnel, and sales-engineering representation.

Camel Appointed Detrex Alkali Sales Manager

The promotion of Leroy Camel to sales manager of the Alkali Division has been announced by W. W. Davidson, vice president in charge of sales of Detrex Corporation, Detroit 27, Michigan. Mr. Camel was previously manager of the eastern section of the Alkali Division with offices in Cleveland, Ohio.

The continued expansion of business in this division has brought about the necessity for a larger sales organization. Mr. Camel brings to his headquarters in Detroit wide field, laboratory, sales and service experience in the cleaning industry.

The promotions of Joel Cooper, Detroit, and Merman Grosser, Cleveland, as division managers in their respective territories were also announced.

Hoyle Joins American Buff

Edward W. Hoyle, who has been connected with the plating, polishing and buffing industry for more than 20 years, has joined the staff of the American Buff Company, 711 W. Lake St., Chicago, Ill. Mr. Hoyle served on the Board of Managers, Chicago Branch, of the American Electroplaters' Society during the past year. In his new connection he will serve the industry in the solution of buffing and polishing problems.

Dr. Knapp Presents Paper at A. E. S. Meeting

Investigation has shown that the organic reagent dithizone can detect copper rapidly in a nickel plating solution and that it is capable of detecting quanties of copper as low as a few micrograms, Dr. B. B. Knapp, chemist, explained in a paper entitled "Rapid Determination of Copper in Nickel Plating Baths," which he read at the annual meeting of the American Electroplaters' Society recently held in Cleveland.

The paper described the method for rapid colormetric determination of copper in a nickel plating solution. The method embodies the mixed color principle which only involves matching the color of the unknown with that of a set of standards. The entire determination is carried out in a test tube and copper content can be measured over the range of 0.004 to 0.5 grams per liter.

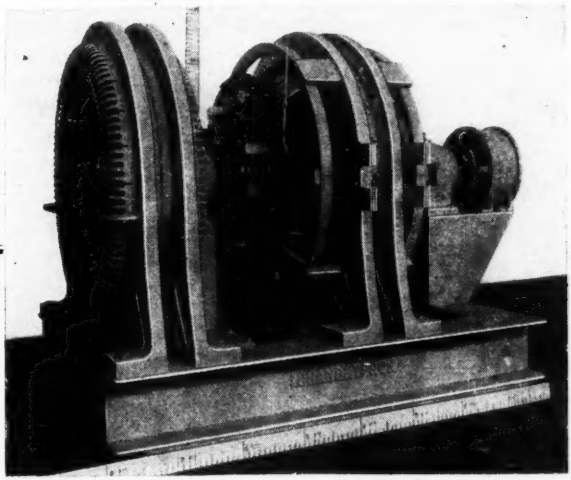
Dr. Knapp is with the Bayonne Laboratory of The International Nickel Company, Inc.

Ed Crane Serves Buffalo Area

Ed Crane has been appointed industrial sales engineer in the Buffalo area for the Brown Instrument Co., division of Minneapolis-Honeywell Regulator Co. Mr. Crane has been transferred from the New York City office. He will include the northwest section of the New York state in his territory.

BIONOL--Cleaner and Degreaser
SAVES TIME
IN PREPARING METALS FOR RUSTPROOFING, PLATING, AND ALL FINISHING OPERATIONS.
PERFECT CLEANING WITHIN 1 TO 3 MINUTES.
WRITE FOR COMPLETE DATA
BIOFEN LABORATORIES ● 14 Sixth Street, Bridgeport 7, Conn.

CHANDEYSSON GENERATORS ARE BACK ON A FURLOUGH



For more than two years the war demands of informed and discerning buyers made it very difficult to secure Chandeysson motor-generator sets for electroplating and anodizing without long delay.

Tooling-up has now decreased to an extent which permits delivery of Chandeysson equipment almost as quickly as could be accomplished in peace times.

We now have in stock (subject to prior sale) 7500 ampere, 12 volt sets and 5000 ampere, 6 volt sets. Other sizes can be manufactured in reasonable time.

•

CHANDEYSSON ELECTRIC CO.

4092 BINGHAM AVE. **ST. LOUIS, MO.**

New Firm Organized

William A. Crowder, president of the Industrial Hard Chromium Company, Newark, N. J., has announced the formation of a new company which will manufacture plating equipment for use in the hard chromium plating process. The new organization is to be known as the Industrial Hard Chrominum Plating Equipment Corporation.

The manufacturing facilities will be located at 13 Rome St., Newark, adjoining the site of the Industrial Hard Chromium Company.

Quaker Chemical Elects Secretary

At a recent meeting of stockholders, William A. Whiteside was elected secretary of Quaker Chemical Products Corporation, Conshohocken, Pa. Mr. Whiteside has been with the firm for the past 12 years, serving in the capacity of personnel and office manager.

Other officers of the corporation are: president, D. J. Benoliel; vice presidents, L. O. Benoliel and Emil Niessen, and treasurer, Frank Batchelor.

Detrex Enlarges Branch Office Organization

To provide the most efficient customer service possible, Detrex Corporation, Detroit 27, Mich., has enlarged two eastern sales and service offices and added another in the midwest.

The eastern region headquarters in New York City are now located in the Empire State Building, Suite 4113. It is under the direct supervision of Stanley A. Harris, eastern region manager. The Philadelphia branch office has been moved to 12 S. 12th St. Wayne Gaddy, Philadelphia division manager, is in charge of this office. A new branch office for the Indiana territories has been opened in Indianapolis at 11 S. Meridian St. Charles M. Munns is the division manager in charge of this office.

In their nation-wide coverage of sales and service for industrial cleaning equipment and materials, Detrex now has a total of 19 branch offices in major cities. Of these, 14 will handle orders, correspondence and service direct with customers and prospects. Releases for cleaning materials will be made from warehouses conveniently located in the various industrial centers covered by each of these branch offices.

F. L. A. Appoints Technical Director

The appointment of Joseph M. Smith to the newly-created post of technical director is announced by the Fluorescent Lighting Association. His appointment was ratified at a recent directors' meeting, and he now heads up the technical activities of this association, which is composed of manufacturers, contractors, jobbers, engineers, architects and others interested in the standardization and promotion of this form of electric illumination.

Appointments at Special Chemicals Co.

Special Chemicals Company, 30 Irving Pl., New York 3, N. Y., announces the appointments of Ralph H. Lee and Walter H. Pearce to its staff.

Mr. Lee's duties will include office management, sales and sales promotion. Mr. Lee brings with him 17 years of experience obtained with the Grasselli and Electrochemical Divisions of DuPont.

Walter H. Pearce, who will act as development engineer, at one time was instructor of chemistry and librarian of City College, New York, and more recently has been with Weisberg and Greenwald and W. D. Maxson Company. Mr. Pearce will handle the chemical, research and development work.

BETTER PLATING, LESS COST!
"MGC" ELECTROPLATING EQUIPMENT
Write for Interesting Details TODAY!
MOTOR GENERATOR CORP., HOBART SQ. Box PF-74 TROY, OHIO

NEW Synthetic Base Fluids

ONE WASHING REMOVES SOIL OF ALL TYPES . . . STOPS RUST

● Solventol No. 27—has now been adopted by most of the major munitions and parts manufacturers.

● Used with 40 parts of water—it not only removes greases, compounds, abrasives, red lead, chips and other inerts to a new degree of perfection—but it temporarily conditions the surfaces of all metals against rust, corrosion and hand soiling.

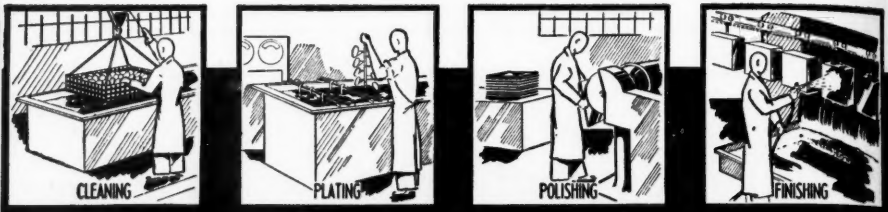
● One fast stage of spray washing—with light air blowoff—is usually enough!

● No. 27 can be used in most standard washers—or our complete engineering service will design faster streamlined units for you.

● Telephone, wire or write—SOLVENTOL CHEMICAL PRODUCTS, INC., 15841 2nd Ave., Detroit, Mich.

FOR PRODUCTION METAL CLEANING AND SURFACE CONDITIONING

SOLVENTOL

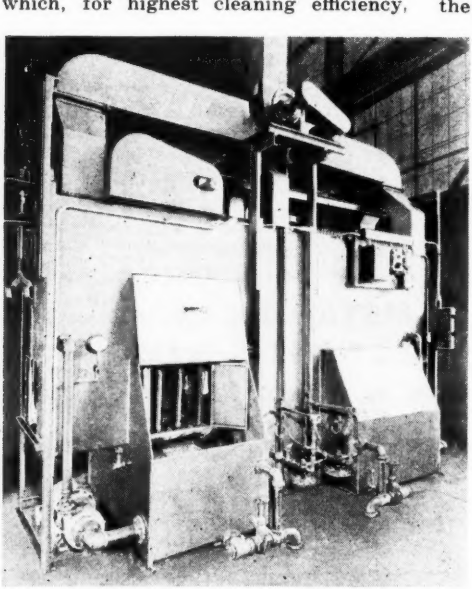


New Equipment and Materials

Monorail-Spray Metal Washer

An improved design in metal washing equipment, the Monorail-Spray Washer, has been developed by the Metal Washing Machine Division of American Foundry Equipment Company, 510 S. Byrkit St., Mishawaka, Ind. The unit is designed to handle metal parts which, for highest cleaning efficiency, must be rotated while they are passing through the cleaning chamber. Typical work of this type includes intricate circular parts or those with many ports, crevices or openings.

A monorail conveyer is provided to carry the work through the path of well-positioned power sprays. Parts are suspended from hooks and can be rotated while passing through the the cleaning stages.



Monorail-Spray Metal Washer

Accessibility of all working parts is an important feature of the design. The high pressure pumps and controls are easily serviced. Large access doors are provided to enable the removal of the spray system when periodic cleaning is necessary.

Although the standard Monorail-Spray Washer is designed primarily for washing and rinsing operations, it is so constructed that additional units like drying and rust-proofing sections may easily be added to the machine to suit variations in production setups.

The unit can be equipped for heating with steam, gas coils or electric immersion heaters. Thermostatic controls are furnished. To carry away steam and vapors, a well - proportioned ventilation ductwork is provided on the top of the unit.

Syconizing

Development of a highly refined, hot dip lead alloy, known as "Sycoloy," for use in rust-proofing steels and steel alloys has been announced by Syco Products Company, 5-220 General Motors Building, Detroit 2, Mich. The process of applying Sycoloy to the metals is called "Syconizing;" the latted is said to approximate permanent protection against corrosion.

Syconized parts can be painted, lacquered or chromed. Steel tubing can be Syconized in the straight and then put through severe bends without the coating scaling or scraping off. Tests are said to prove that Sycoloy penetrates into the steel even deeper where the greatest pressure is exerted. It is possible to make two or more deep draws with Syconized steel without die lubricant or annealing operations. The Sycoloy flows with the steel. Wire cable can be Synconized, providing rust-proof protection even to the inner strands.

Sycoloy is highly fluid; it penetrates, bonds and acts as its own lubricant. The resultant surface finish is bright and smooth.

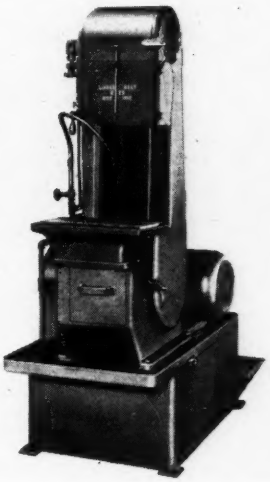
The method of application is hot dip. Customers may either purchase Sycoloy in pig form and Syconize their own products, or the work can be Syconized for them by Syco Products Company.

Porter-Cable Model AG-8 Wet Belt Surfacer

Since the introduction of high speed wet belt machining, there has been a demand among users for a machine with maximum coolant capacity and rigid construction for increased grinding accuracy. In the Model AG-8 wet belt surfacer placed on the market by the Porter-Cable Machine Company, 302-4 Wolf St., Syracuse, N. Y., it is claimed that these requirements have been adequately filled. Equipped with a 35-gal. self-contained recirculating pump system. an abundance of coolant is readily available for all grinding operations.

It is claimed that close tolerances, often to 0.0005 in., are held on the machine, even with inexperienced operators. Other features of the surfacer include a readily accessible waste clean-out drawer; a "joggle" type switch for easy tracking of belts; higher table for added convenience to the operator; a flexible tube to provide "spot" coolant where it is needed in greater quantity, and increased platen grinding area.

The Type AG-8, illustrated herewith, is used for grinding steel, aluminum,



Model AG-8 Wet Belt Surfacer

bronze, magnesium, glass, plastics, fibre, hard rubber, ceramics and so on. Such hazards as heating, warping, discoloring, flowing and chipping of material being ground are said to be eliminated.

"Barel-Cel" Plating Unit

To meet the demand for a small compact barrel plating unit, the Precimet Laboratories, 64 Fulton St., New York 7, N. Y., have recently placed on the market a two-gallon barrel plating unit known as the "Barel-Cel." Although originally designed for the plating of precious metal, it is also being used satisfactorily in copper, nickel brass and silver plating.

The Barel-Cel is simply constructed; it consists of an adjustable cathode and anode, and a tilted tub which rotates slowly during the plating operation. The power unit electric motor can be plugged into any convenient outlet; no special wiring is necessary. The plating current supply to the unit is furnished by means of two wire leads that are fastened to the plating current bars.

"Barel-Cel" Plating Unit

A special feature of the construction is the tub, which is removable to permit flexibility in handing the solution, such as raising it to the proper temperature before plating.

The Barel-Cel is particularly suited to the plating of such small pieces as springs, catches, rings, ear wires, pins and screws. Perhaps the outstanding advantage of the Barel-Cel is its small size.

A&W No. 471-15 Camouflage Enamel

Milk cans, or other packed cans, which must be coated with camouflage enamel will meet the finishing requirements of Army Spec. No. CQD 200A when properly finished with A&W No. 471-15 Camouflage Enamel, product of Ault & Wiborg Divisions, Interchemical Corporation, 350 Fifth Ave., New York 1, N. Y.

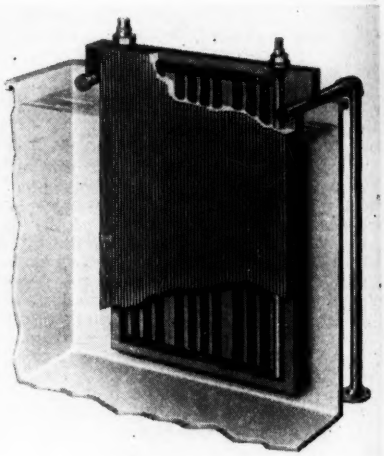
This government-approved finish, which protects food cans from corrosion and prevents visibility from the air, may be applied either by spraying or dipping. It air-dries in eight to ten minutes; and if air which has been heated to approximately 175 deg. F. is caused to flow over the cans as they come out of the dip tank or spray booth, drying time is cut to three to five minutes.

An additional advantage claimed for A&W No. 471-15 Camouflage Enamel is its excellent adhesion. It will not chip off and fall into the contents when the can is opened.

"Karbate" Heat Exchanger

The National Carbon Company, Inc., 30 E. 42nd St., New York, N. Y., has developed a compact and sturdy type of corrosion-resistant "Karbate" heat exchanger to meet the need for a chemically inert, mechanically strong, heating (or cooling) unit for use in pickling tanks and other metallurgical applications. The manufacturer states that the Karbate material from which the heater is made is an impregnated graphite impervious to liquids under high pressures; it possesses high heat transfer values and is resistant to practically all acids, alkalis and solvents.

The exchangers are of plate type, employing the principle of extended, or corrugated, surface to attain maximum heat transfer area without bulkiness. Installation requirements and economical manufacturing methods caused Na-



"Karbate" Heat Exchanger

Typical small parts that are successfully deburred by the Roto-Finish Process.

DE-BURR MECHANICALLY!

Loading parts and Roto-Finish Grinding Chips into a Roto-Finish Machine. The larger picture shows the Roto-Finish department—a Defense Plant Corporation installation that saves the work of many hands and boosts production tremendously.

Mass production mechanical deburring at a prominent aircraft parts manufacturing plant in Detroit proved so satisfactory that today an entire Roto-Finish department has been developed.

The speed-up in production and amazing savings are typical. Working equally well on parts of steel, brass, aluminum, magnesium, stainless and nickel steels, it is natural that Roto-Finish offers tremendous possibilities for peacetime production, too! Send for literature—and we'll be glad to receive sample parts for processing.

ROTO FINISH
THE STURGIS PRODUCTS CO.

THE STURGIS PRODUCTS CO.

280 JACOB ST., STURGIS, MICHIGAN

tional Carbon Company to adopt four standard design groups incorporating both parallel and series flow channels, thus making possible 30 different combinations to meet the widest range of heating and cooling requirements.

Small and interchangeable, the units are designed so that they can be readily adapted to various sizes of tanks, can be mounted in multiple or single unit, and need little space in the tank.

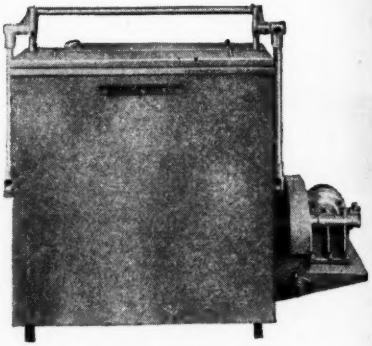
Major features of the heat exchanger are its corrosion resistance and mechanical strength, which means wide application where corrosive conditions and mechanical shock are inherent to the process. Designed to meet precisely these conditions, the Karbate heat exchangers are said to be maintenance free and give maximum service.

"Simplex" Metal Parts Cleaner

The Sturdy-Bilt Equipment Corp., Dept. P644, West Allis, Wis., announces the addition of a special small all-purpose unit of its "Simplex" line of metal parts cleaners. Designed to meet the need for cleaning high speed small parts and tool equipment cleaning, the units are said to do a thorough job of washing away oil, chips, dirt, and so on.

The operation of the compact Simplex combines active soak with swishing action for positive removal of all foreign substances. Hot or cold solution may be used. The operator loads the tray with the parts to be cleaned, throws the switch and the Simplex does the rest.

The fully-insulated welded steel tank and the few working parts, plus the all-around simplicity, contribute to the effectiveness of the machine. Suggested uses include washing, slushing, cleaning, rinsing and dipping operations of metal parts, housings, crankcases, small assemblies, tools and small gears of kinds where fast production and high



"Simplex" Metal Parts Cleaner

quality finished products are necessary for wartime production. The units can be installed singly in many different departments or in series—one unit for cleaning, another for rising or rust-prevention coating, and others for special requirements.

O'Neal Film-Fix Aluminum Paint

O'Neal Paint Products, Inc., 13228-30 Madison Ave., Cleveland, Ohio, manufacturers of Film-Fix Aluminum Paint, will furnish free trial samples of the

FOR CONTROLLED, EFFICIENT PICKLING

WRITE

THE WM. M. PARKIN CO., • Highland Bldg., Pittsburgh, Pa.

NEP-ACID INHIBITOR—To Control Acid Action on Clean Metal

SUMFOAM PICKLING COMPOUND—To Control Fumes

"THOSE PERFECT PARTNERS FOR PICKLING"

"THE TREND IS TO PENTRATE"

As designers turn toward consumer merchandise — the trend is to Pentrate. Dependable results on huge quantities of war materials has gained a positive place for Pentrate black in the steel finishing field. It's appearance, rust resisting and friction reducing qualities will meet the demands of post-war products.

Send for free Pentrate catalog.

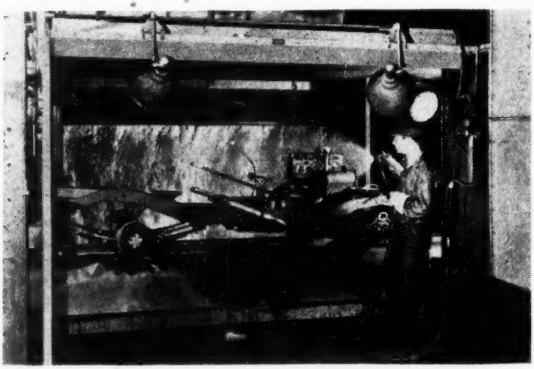
HEATBATH CORPORATION
SPRINGFIELD • 1 • MASSACHUSETTS

paint made up to the specifications of the individual paint user.

A specification guide incorporating six important specifications is also available to assist aluminum paint users in selecting the correct Film-Fix Aluminum Paint for the application under consideration.

Traversite

A paint-reclaiming agent known as "Traversite" has been placed on the market by The Penetone Company, Tenafly, N. J., for use in connection with waterfall or waterwash spray booths. Traversite is said to be a highly concentrated, potent, but harmless powder which, when introduced into the circulating water at the rear of the booth, prevents the overspray from fouling the flood sheets, nozzles, and circulating system and also prevents the metal back-set from corrosion and rust. An ideal pH value is said to be maintained for as long as 53 hours of continuous operation.



Typical Spray Booth in which Traversite is used

The amount of Traversite used varies with the density of the paint being sprayed but, in general, the water should originally be charged with from 1½ to 3 lb. per 500 gallons. Following the initial mixture, only one pound of Traversite needs to be added during each subsequent eight-hour working period to keep the solution up to its original potency. It is claimed that Traversite does not slow down the painting operation; provides a maximum wetting action with a minimum of foam, and contains no caustics or trisodium phosphate.

With the properly functioning spray booth the paint is prevented from adhering to the walls of the booth during the painting operation. The surplus paint is caught by the falling water at the rear of the booth and accumulated in the water reservoir, from which much of it may be reclaimed. It is claimed that this action on the part of Traversite provides the user not only with the advantage of thus saving paint that would otherwise be wasted, but it makes the operation less hazardous and removes a fire hazard by preventing pigments from collecting in the exhaust stack.

Hot Dip Lead Alloy Coating

The National Lead Company, 111 Broadway, New York, N. Y., has announced that alloy and flux developments, as well as improved technique of application, now point the way to wide use of low-tin-content alloy coatings to render metal products corrosion resistant. Ease of handling of the materials, wide adaptability, plus the satisfactory appearance of the finished product, are features of the development.

The National Lead Company currently markets low-tin-content alloys suitable to all hot dip processes now in use. These are said to show excellent wetting properties, uniform coating characteristics, low melting points, good fluidity, minimum dross, and, in general, excellent working properties. The coatings have other advantageous properties: for example, the alloys become harder with age, increasing from 12 to 20 Brinell (500 Kg) after two or three days at room temperature. This results in abrasion resistance and ability on the part of the coating to withstand the mechanical injury frequently encountered in handling coated products.

The high ductility of the lead alloys is evidenced by the elongation values, which approximate 39 per cent in tensile tests. The tensile strength of lead is 1800 psi, whereas that of the low-tin-content lead alloy, Alloy No. 560, is 6500 psi.

The actual coating operation of the

Buy More War Bonds

Du-Lite Chemifinishes for blackening Steel, Brass, Copper, and Zinc parts have been thoroughly tested both in the laboratory and in actual production. They are now accepted as standard by industry.

Du-Lite Chemifinish not only provides protection from rust and corrosion, but also produces an attractive black finish that is suitable as a final finish in most cases.

Du-Lite Chemifinishes are applied by simple immersion in a chemical solution. No electric current is required. Chemifinish processes are easily adapted to your regular production conditions.

Du-Lite Field Representatives are located in the leading industrial centers. They are trained men, well versed in the techniques of metal finishing, and can show you how to produce the desired finish in your plant.

DU-LITE CHEMICAL CORP.
MIDDLETOWN, CONNECTICUT

articles, after the requisite cleaning, pickling and fluxing have been done, consists of immersion of the article in the molten metal, with sufficient agitation to assist in the freeing of adhering flux. The coated articles may be cooled in air, after dipping, or they may be quenched in oil, which latter technique results in even, fine-grained coatings.

Jones Heavy Duty Polishing Lathe No. 143

A polishing lathe for heavy duty work has been developed by the Jones Engineering Company, Dept. B-1, Ellwood City, Pa. Known as the Jones Heavy Duty Polishing Lathe No. 143,

Jones Heavy Duty Polishing Lathe No. 143

the unit is designed for bench or stand mounting. The lathe is a production machine and employs two Jones contact rolls equipped with fast-cutting, endless abrasive belts.

The No. 143 lathe is built for two 14-in. diameter, 3-in. face contact rolls; it has a $1\frac{11}{16}$ in. diameter shaft and is 34 in. long overall. Spacing between the inside faces of the wheels is 24 in., with 9 in. from the base to the center of the shaft. Longer shafts are available. The unit is equipped with a three-groove V-belt motor shaft, and is used with a 2, 3 or 5 h. p. motor. The motor is mounted underneath the bench or stand where it is free from dust and dirt.

Stripping Copper Plate

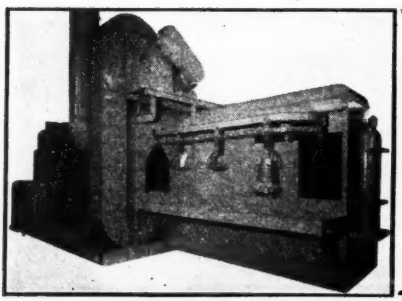
Several methods and processes have come into general use for removing copper from steel parts that have been copper plated for selective carburization. The W. P. B. urges that neither chromic avid and sodium cyanide be used for this purpose because of short supplies, but because of recent developments in regard to the availability of salts used in preparing stripping solutions, two methods which are especially timely are recommended by the Hanson-Van Winkle-Munning Co., Matawan, N. J.

(1) H-VW-M Copper Deplating Solution. This is an all-potassium salt solution prepared as follows:

Copper cyanide .....4.0 oz./gal.
Potassium cyanide .....8.4 oz./gal.
Potassium hydroxide .....2.0 oz./gal.
Potassium carbonate .....5.0 oz./gal.

Operating conditions:

Temperature .....180 deg. F.
Tank voltage .....2-2.2 volts
Anode current density—50-60 amp./sq. ft.
Cathode-anode ration.....2:1
Free potassium cyanide—2.4—2.6 oz./gal.
Cathodes—Steel sheet or empty ball anode containers which can be periodically returned to the plating tank.
Agitation stirrer or agitator—Mechanical motor.
Tank .....Steel



HYDRO-FLOW
INDUSTRIAL WASHING MACHINES

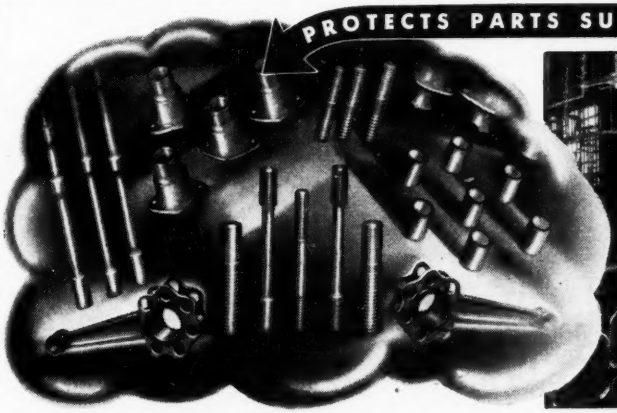
Streamlined design. Recirculating hot or cold air blow off. Hidden motors, pumps and pipes are easily accessible. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Handling alkali to varsol as cleaner. Monorail, Belt, or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.

INTERNATIONAL CONVEYOR & WASHER CORP.
Write for circular.
652 E. FORT ST. **DETROIT, MICH.**

MICCROIL

A HIGH FLASH ANTI-RUST OIL

PROTECTS PARTS SUCH AS THESE



Especially Suitable For PLATING PLANT USE

In plating plants, where a corrosive atmosphere is always prevalent, Miccroil has proved extremely valuable in protecting metal parts from corrosion and oxidation. As an example, when the O.D. of a part is plated and removed from the plating solution, the I. D. must be protected from corrosion immediately. Immersion in Miccroil protects the non-plated surface.

In actual tests, Miccroil resisted corrosive action almost indefinitely in a plating plant where the relative humidity varied from 92% to 96% at 87° F. Write for full information.

DEVELOPED AND MANUFACTURED BY EXPERIENCED PLATERS

Offers These Features:

HIGH FLASH POINT
Possibility of fire hazard reduced to minimum.

LIGHT IN COLOR
Does not alter appearance of part on which it is applied.

UNIFORM COVERAGE
Assures uniform and effective protective film over entire surface.

NEVER BECOMES RANCID
Contains no ingredients which produce rancid odor.

MICHIGAN CHROME & CHEMICAL CO.
6342 EAST JEFFERSON • DETROIT 7, MICHIGAN

Time of stripping to strip 0.001 in. copper .....15 minutes required

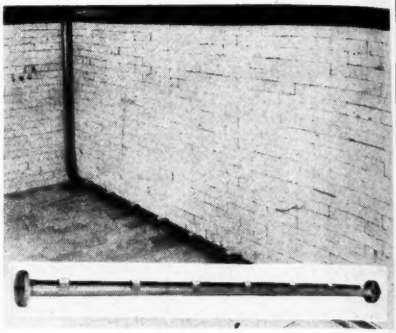
(2) H-VW-M Immersion Method. The copper-plated work is immersed in a solution of 1 lb./gal. of liver of sulfur for five to ten minutes. The articles are then rinsed and immersed in a solution of sodium cyanide 16 oz./gal., or potassium cyanide 21 oz./gal., for approximately five minutes. In tests with a steel panel having an 0.001 in. thickness of copper, the minimum immersion time in the liver of sulfur solution was seven minutes and in the sodium cyanide, three minutes. Although the liver of sulfur solution can be operated at room temperature, sulfide formation is hastened at elevated temperatures; 120 deg. F. is suggested if it is convenient to heat the solution.

Heil Jet Agitator

The Heil Engineering Company, 12901 Elmwood Ave., Cleveland, Ohio, has developed a steam jet for tank processing of bar metals, wire, and continuous sheet or strip, furnished in flanged sections which can be coupled together to provide any desired length, and to extend the agitating and heating effect to any part of a tank.

Designed to speed pickling or processing and to provide complete agitation and uniform heating, the jet can be adapted to square, rectangular or round tanks. Boiling temperatures can be attained, at which these rugged jets are said to give unusually long service. Sections are usually made in lengths of about 10 ft., and are coupled with lead bolts, with a blind flange to close the open end. Nozzles are spaced along the tank bottom on 15-in. centers unless otherwise specified by the user.

The series of nozzles along the entire length of the tank creates a rolling, agitating effect similar to a barrel roll, causing the liquid to circulate above and around the immersed parts. The effect is increased by placing jets on either side or all around the bottom of the tank, with nozzles set at angles to produce the maximum rolling effect. The nozzle used is a patented device with an orifice of graphitic carbon, which is unaffected by the corrosive attack of most chemical solutions.



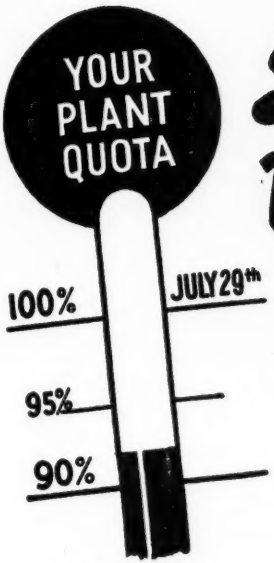
Heil Jet Agitator

Several modifications of this same style jet are available. These have been developed for batch processing.

The jets are furnished with a steam flange and bolts to connect to a standard 6-in. O. D. flange reduced for 1-in. steam supply line. The recommended steam pressure is 80 lb., although a maximum pressure of 125 lb. may be used. It is possible to use air steadily or intermittently along with steam to produce greater agitation and in some cases this has been found desirable.

WE RECOVER YOUR
SOLVENTS and THINNERS
from Sludge, Waste, Wash, Spoiled Lacquers, etc.
AND SAVE YOU MONEY
Each shipment—one drum or a carload—receives PROPER and SEPARATE TREATMENT.
Solvents recovered by the Lofgren Process.
Write to:
SOLVENTS RECOVERY SERVICE, Inc.
1019 Broad St. or Newark, N. J.
HAMMOND CHEMICAL SERVICE, Inc.
241 Brunswick St. Hammond, Ind.

For a real good polishing job use
KEYSTONE EMERY
TURKISH — NAXOS — AMERICAN
KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.



Stay at Your Battle Stations!

MANAGEMENT • LABOR

—The 5th War Loan Drive is still on. July 29th is the last payday in the drive.

The U. S. Treasury has set the overall goal at $16,000,000,000-$6,000,000,000 from individuals alone. This is the biggest sum ever asked of the American people—*and it must be raised!*

Keep fighting. Tighten up your 5th War Loan Drive organization. Step up your solicitation tempo. Drive! Drive!! Drive!!! Hit your Plant Quota's 100% mark with a bang that'll proclaim to all the world that the U. S. Home Front is solidly in back of the Fighting Front.

Need help? Need ideas? Call on the Chairman of your War Finance Committee.

Here's the Quota Plan:

1. Plant quotas are to be established on the basis of an *average* $100 *cash* (not maturity value) purchase per employee.
2. Regular Payroll Savings deductions made during the drive accounting period will be credited toward the plant quota.
3. Employees are expected to contribute toward raising the cash quota by buying extra 5th War Loan Bonds: 1—Outright by cash. 2—By extra installment deductions. 3—By extra installment deductions plus cash.

Example: **JOHN DOE Mfg. Co.** —1,000 Employees
1,000 employees x $100=$100,000 Cash Quota

Regular Payroll deductions during the eight weekly payroll Accounting Periods of June and July.	30,000
	$70,000 (to be raised by sales of extra Bonds)

BACK THE ATTACK—SELL MORE THAN BEFORE

The Treasury Department acknowledges with appreciation the publication of this message by
PRODUCTS FINISHING

This is an official U.S. Treasury adv.—prepared under the auspices of Treasury Department and War Adv. Council

Birdseye Lo-Glo MM Filament

An improved tungsten filament has been introduced by the Wabash Appliance Corporation, Dept. 13, 345 Carroll St., Brooklyn 31, N. Y., in its Birdseye infra-red heat lamps. Known as the Lo-Glo MM Filament, it is of coil-coil construction. The filament burns at a lower color temperature, reducing spectral flare. In addition, the Lo-Glo MM Filament is said to increase the radiant energy output of Birdseye heat lamps.

Birdseye Lo-Glo MM Filament Lamp

It is claimed that the shape of the MM filament eliminates "cold spots" and produces a well focused and effective pattern of infra-red rays. Maximum service life is another feature.

Birdseye Lo-Glo Infra-Red Heat Lamps have the heat-proof Superlok Base and the efficient and durable ceramic heat reflector disc.

Trans-Tox

Transtar Corporation, 50 Church St., New York, N. Y., has announced the development of a non-toxic fungus inhibitor. Marketed under the trade name "Trans-Tox," it is available in two forms—Trans-Tox 2 X G (liquid) and Trans-Tox P. W. (powder). The manufacturer states that it may be used in any proportions without losing its non-toxic quality.

Trans-Tox is non-volatile; in testing, it has been heated for 24 hours at 375 deg. F. and the solids remained. Trans-Tox is being used in paints, lacquers, synthetics and plastics.

"Lucite" Tank Lining

Resistance of "Lucite" methyl methacrylate desin to attack by acids is the basis for a new use of the plastic as the lining for 28,000-gallon tanks holding chromic and sulfuric acid anodizing solutions in the treatment of aluminum alloy aircraft parts. Lucite is a product of E. I. du Pont de Nemours and Company, Inc., Wilmington, Delaware.

Sheets of Lucite are used to line the huge tanks in which the aluminum parts are given surface oxidizing treatment at the Curtiss-Wright Corporation plant, Columbus, Ohio. Use of the plastic is said to extend the life of the tanks indefinitely. The Lucite is not affected by sudden temperature changes nor by the 15 per cent chromic acid solution.

The linings were installed as the result of the company's experience with Lucite tubes as the insulation for parts while exposed to the electrolytic action of the acid baths, in which use the plastic was credited with doubling the output of the anodizing equipment at the plant.

Steel Grip Safeguard No. 13997

For the use of industrial plant employees who handle sharp, jagged parts, Industrial Gloves Company, 746 Garfield Blvd., Danville, Ill., has reinforced its standard thumb two-finger guard of chrome leather with steel ribbons. This Steel Grip Safeguard is designated as No. 13997.

Steel Grip Safeguard No. 13997

Placed vertically and staggered, the steel ribbons give excellent protection

FUNCTIONAL

Used in airplane, auto and numerous other industries for —

SOUND DEADENING • TEMPERATURE INSULATION • INTEGRAL GASKETS • SHOCK-ABSORBING SURFACE • NON-MAR SURFACE PROTECTION.

DECORATIVE

Applied in various lengths and colors to wood, paper, cloth, metal, etc., the following effects are produced —

SUEDE LEATHER • FURNITURE UPHOLSTERY FABRICS • AIRPLANE AND AUTO UPHOLSTERY FABRICS • VELVET • VELOUR • MOHAIR.

Check this list of uses for

FLOCK

Flock is finely cut fabric particles supplied by us in a variety of colors and lengths.

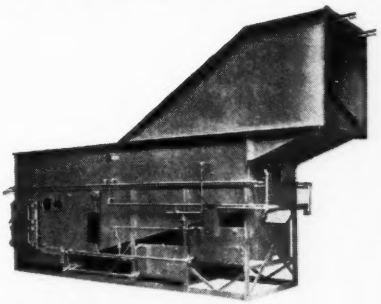
REQUEST SAMPLES AND PRICES

RAYON PROCESSING CO. OF R. I., INC. • **65 TREMONT STREET CENTRAL FALLS, R. I.**

BLAKESLEE DEGREASERS SPEED-UP PRODUCTION

Maintain production and obtain 100% grease-free metal surfaces with Blakeslee Degreasers. Efficient engineering design and construction insures production and *lowest* solvent operating costs.

We would welcome the opportunity of discussing the application of Blakeslee Degreasers or Metal Parts Washers with you and just how your production may be speeded and cleaning costs cut. An engineer will be pleased to call on you without obligation on your part.



G. S. BLAKESLEE & CO.

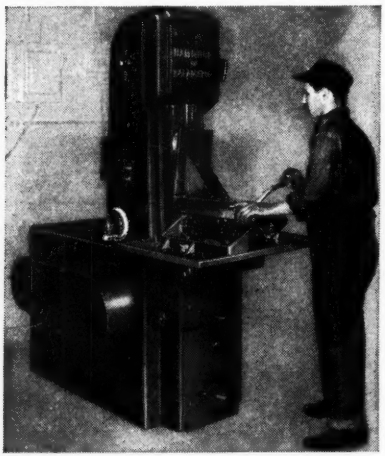
CICERO STATION

NEW YORK CHICAGO 50, ILL. TORONTO

to the worker against cuts and abrasions and, at the same time, add to the wear and service of the handguard. The protector is steel stitched throughout and is held firmly in position by a quick-adjustable strap at the wrist.

Hammond 10-In. Abrasive Belt Grinder

A 10-in. "wet-n-dri'" abrasive belt grinder has been announced by Hammond Machinery Builders, Inc., 1622 Douglas Ave., Kalamazoo 54, Mich. The Model V-10 grinder carries up to a 10-in. abrasive belt and weighs over a ton. It is said that any material that



Hammond Model V-10 Abrasive Belt Grinder

can be ground can be surfaced or finished on the Model V-10. Operations such as deburring, descaling, chamfering, beveling and the finishing of pads, bosses and thin sections of castings, forgings, stampings, and so on, are within the range of work possible.

The abrasive belt can operate to the edge of the belt backing-plate where clearance is provided for getting into corners. The machine will accommodate various types of tables, and the number of special work-holding fixtures to hold work of various shapes and sizes is unlimited. The machine is now equipped as standard with either of two types of tables—oscillating or plain, determined by the class of work being handled. The oscillating table has a micrometer stop graduated in 0.001 in. for accurately controlling depth of grind, and has three "T" slots for attaching fixtures. It has a single handle for both feeding and oscillating the work. Oscillation permits fast cutting and provids uniform wear on belt and belt-backing plate, it is claimed.

The idler pulley is mounted on a heavy column which incorporates a built-in automatic belt tensioning device. It is claimed that this feature insures automatic taking-up of belt stretch and provides vibrationless operation. Accuracy within reasonably close tolerances can be depended upon in large volume production.

A large capacity coolant tank unit is located in the base of the machine and adequate controls are provided for wet grinding operations. Coolant flow controls are located outside the machine within easy reach of the operator. For dry operation, the coolant unit is omitted and a connection for exhaust provided.

Pemco "Mirac"

Pemco Corporation, Baltimore, Md., has announced the development and release of what is claimed to be the first commercially successful one coat white—one fired—direct to steel porcelain enamel. The product is designated as "Mirac."

Mirac requires no special bond or pickling equipment, nor does it need special handling. It is said to have excellent adherenece and can be fired at 1500 deg. F. to produce a brilliant, highly opaque finish.

RCA Electron Microscope

The RCA Electron Microscope recently announced by Radio Corporation of America, Camden, N. J., has a wide variety of uses, but the one which will be of most interest to the metal-finishing field is the study of sizes and shapes of small particles in such products as paints, plastics and synthetic rubber. The desk-size console microscope is expected to find many applications in factories and industrial laboratories.

The instrument makes possible useful magnifications of minute particles of matter up to 100,000 times. Of more sim-

EDMONT

INDUSTRIAL GLOVES

Acid-Caustic-Oil **PROOF** Synthetic Rubber Coating. Fabric Reinforced Lining

for **MEN and WOMEN**

EDMONT MFG. CO.
509 Orange St., Coshocton, O.

SOL-KLEAN

for

Better Paint Adhesion

INDUSTRIAL CHEMICAL PRODUCTS CO.
DETROIT 7
Milwaukee **Fort Wayne**

CARPENTER **METAL BASKETS**

CONVEYOR TYPE BASKET

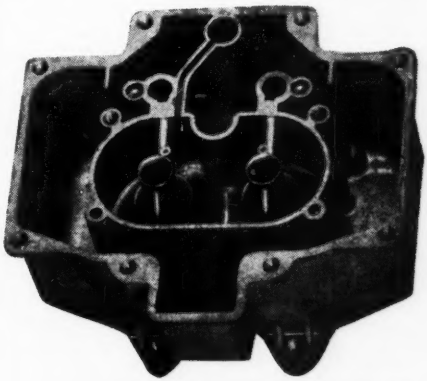
Carpenter metal baskets are made to meet practically every cleaning, pickling, washing, and heat treating operation. They can be supplied in steel, stainless steel, Monel metal, and Inconel—in sizes and types to suit your needs.

Write for illustrated folder describing our complete line of baskets.

"If it's a metal basket we make it."

THE CARPENTER METAL PRODUCTS CO.
446 East 131st St. **Cleveland, Ohio**

MASS PRODUCE PERFECT FINISHES on INTRICATE PARTS LIKE THIS



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Thousands of parts can now be finished at one time—mechanically—with HOWARD Mass - Production Deburring Machines. Eliminates expensive, time-consuming hand deburring on compound surfaces and in recessed areas on die-castings, stampings, forgings, screw machine parts, etc. These machines maintain the most precise measurements, produce greater uniformity in finishes, multiply output to an extent never before possible. Send sample parts for processing or write for detailed information.

SEND FOR NEW CATALOG

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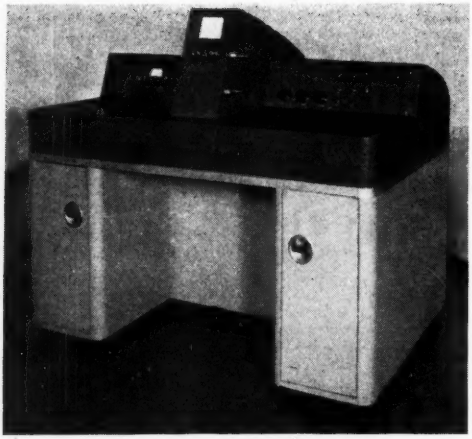

RCA Console Model Electron Microscope

ple design than its predecessors, the instrument can be plugged into an ordinary light socket.

The electron microscope differs from the optical microscope chiefly in that the specimen to be examined is "illuminated" by directing a concentrated beam of electrons through it. These electrons, in passing through the specimen, are affected to varying degrees according to the density and composition of the various parts of the specimen. The electron beam emerging from the far side of the specimen bears the pattern or "image" of the specimen. This image is magnified by as much as 20,000 times by a system of magnetic lenses, which correspond roughly to the optical lenses in a light microscope.

Duralon

The U. S. Stoneware Company, Akron, Ohio, announces the current availability for limited commercial and experimental use of a basic resin having widespread immediate applications. The resin, named Duralon, a furnace derivative, is characterized by low water absorption, insolubility (after activation) in any solvent or combination of solvents, high electrical resistivity, stability in storage and handling, and ease of workablity.

Duralon resin, in its pure form, is a heavy, viscous liquid, dark maroon in color. On incorporation of catalysts and application of mild heat, Duralon reverts to an extremely hard, dense, black substance. Varying physical, chemical and electrical properties can be developed in the base resin by incorporation of the unusual fillers and lubricants. In certain stages Duralon can be readily machined by drilling, milling, turning, sanding and grinding. Duralon resins are readily soluble, before activation, in many hydrocarbons, as well as in ketones and chlorinated solvents.

While preliminary studies indicate that Duralon possesses definite molding possibilities, its paramount immediate importance is an impregnant, as a laminating and bonding agent, or as a protective coating material. It is in these applications that its resistance to moisture, its insolubility in solvents (even at elevated temperatures), its versatile surface characteristics (ranging from a high gloss to a crinkle finish), prove highly essential in solving many present-day problems. It is claimed that many of these properties can be attributed to the unusual wettability of the unconverted resin.

Duralon solutions may be applied as coatings by any one of the conventional processes, or may be used for impregnation of porous materials such as stone, cement, plywood, asbestos, glass fibres, or other fibrous materials, or as a bonding agent for abrasive compounds, powdered metals, and so on, or for adhesive bonding of fibrous materials to each other. No particular surface preparation is needed before application of Duralon coatings, nor is a prime coat necessarily required.

Cotton Facelet for Respirator

American Optical Company, Southbridge, Mass., announces that its R-1000 respirator, developed to protect workers against certain dust, fume and gas hazards, is now being equipped with knitted cotton facelets. These facelets make any respirator more comfortable to wear because they are soft against the skin, absorb perspiration, and give the face a certain measure of protection against dust and dirt.

It is claimed that the facelets help to prevent skin irritation and do away with the necessity for protective creams to avoid face chapping. Designed to make any industrial operation more comfortable, the facelets are particularly valuable where workmen handle such

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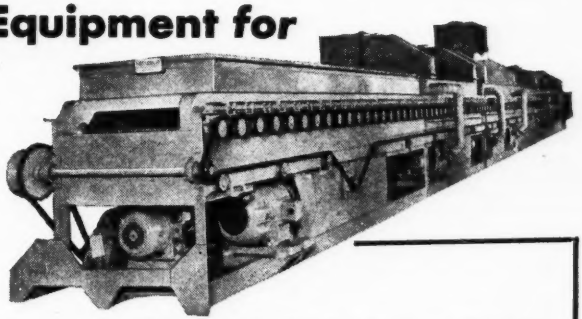
DEPT. PF **VERONA, N. J.**

Metalwash Equipment for *Fast, Efficient Cleaning and Drying of Metal Parts*



This machine is 90 feet in length, all stainless steel construction, requiring 87 H.P. to operate. It is one of other similar pieces of equipment we have furnished for the war effort, and indicates the scope of our engineering and construction facilities.

If your production line becomes slowed up through unforeseen complications in any of the finishing functions of metal parts—washing, drying, pickling, bonderizing or other treatments—we can be of valued service to you, due to our long engineering experience and our extreme familiarity with this field.

Your inquiry is cordially solicited

SEND FOR OUR SPECIAL PF ILLUSTRATED FOLDER.

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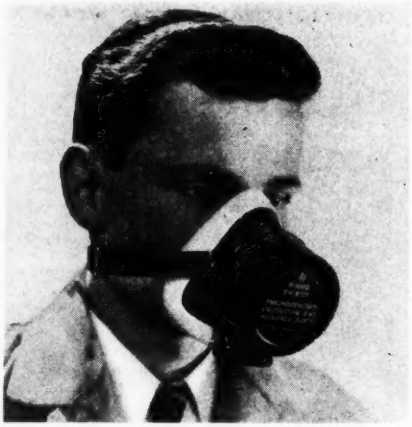


AO R-1000 Respirator with Cotton Facelet

products as cement, lime and gypsum, or perform operations like paint spraying.

The AO facelets can be ordered separately. Packed 50 in a box, they can be washed and used over and over again. They will fit most standard design respirators.

Geon Latex

Creation of a true colloidal latex of one of its Geon vinyl chloride resins in water, without the use of any organic solvents, is announced by The B. F. Goodrich Company, Akron, Ohio. The Geon dispersion resembles rubber latex in appearance. Vinyl resin particles held in stable suspension in the latex are so minute that 25 trillion are present in a single cubic inch. Vinyl resins, including the new latex, are under allocation by the War Production Board. Quantities for experimental use are available, however.

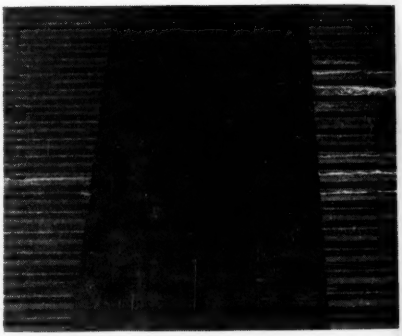
Major potential applications of the Geon latex are in coating paper, paper board and boxboard, textiles, insulating of wire, casting of continuous films, treatment of glass fibers and fabrics, manufacture of gloves and other products in which rubber latex has been used, treatment of leather for added wear and moisture protection, and use in corrosion-resistant paints.

The latex in clear or colored form can be brushed, sprayed or dipped, and the list of practical uses is expected to expand. It can be applied as a flexible, impervious coating. Resistance to flame, increased wear and easy cleaning are among other advantages it brings to materials on which it is applied.

"Flight Floor"

A non-skid walkway coating known as "Flight Floor" has been developed in the laboratory of The Glenn L. Martin Company, Baltimore, Md., and has already seen extensive service in the PBM-3 Mariner, A-30 Baltimore and B-26 Marauder. The coating weighs only 47.5 grams per square foot, is applied at room temperature with an open-nozzle paint spray gun, and is easily repaired in the field. Its principal ingredients are ground cork and Thiokol synthetic rubber.

Flight Floor was tailor-made by Martin laboratory technicians to meet a specific need of the aircraft industry—namely, a non-skid surfacing material for floors and walkways that would stand up under hard wartime usage, and still would not add appreciably to the



Section of deck of a PBM-3 to which Flight Floor has been applied to produce a non-skid surface

weight of the airplane or the time involved in its production. Other properties desired included good adhesion to metal, plywood and painted surfaces; flexibility and resiliency at temperatures from minus 20 deg. F. to plus 160 deg. F.; fire resistance; resistance to gasoline, aromatic fuel, oil, de-icer and hydraulic fluids, salt water and oxidation; and easy repair in the field.

In production use, Flight Floor is ap-

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Write today for full data on how you can adopt the LUPOMATIC DEBURRMASTER equipment for deburring parts for the duration and for post-war plans, saving 85% of your finishing cost.

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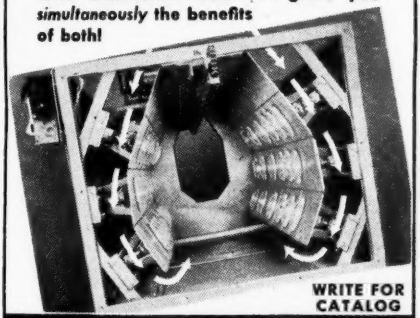

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Good for 100 Gallons of Paint $3 Prepaid

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plied with a regular open nozzle paint spray gun. One application only is needed to build up a coating of sufficient thickness. The material dries rapidly and panels coated with it may be stacked on end after two hours of drying and a light dusting of talc. Twelve to fourteen hours are required, however, before the material is ready to undergo use. Alternate methods of application are with a knife or brush, the latter being particularly recommended for field repair. Patches applied in this manner are said to show excellent coverage and adhesion and blend well with the original coating.

Adhesion and flexibility were determined by exhaustive tests. The former proved excellent on panels of bare 24ST Alclad, anodized 24 S-T Alclad primed with zinc chromate, anodized and primed 24 S-T Alclad spray coated with camouflage enamel, and plywood with one spray coat of sealer. Flexibility was determined by bending around a ½-in. radius at room temperature, minus 20 deg. F. and 180 deg. F., and while very fine cracks resulted in some cases, the adhesion of the material was unimpaired. Today Flight Floor is a military product, but like so many other wartime developments, it holds great promise for the coming commercial air age.

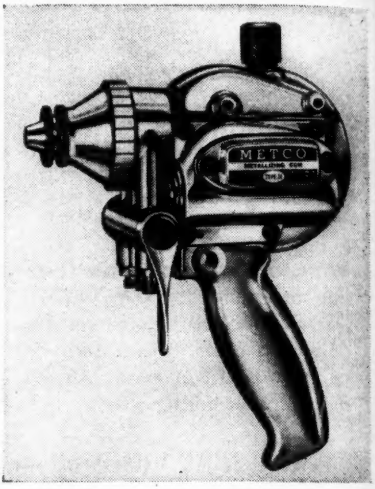
Metco Type 3E Metallizing Gun

Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City 1, N. Y., announces the introduction of the Metco Type 3E metallizing gun, especially engineered for the high speed production spraying of low-melting-point metals. Using ⅛-in. zinc, tin, lead, solder, babbitt, cadmium, or fine gage copper and copper alloys, the gun exhibits high spraying speeds. Rates of deposition, in pounds per hour, include the following: zinc, 40; tin, 70; lead, 110; solder, 90, and babbitt, 75.

Regardless of the type of wire employed, no gear changes are necessary to achieve these high speeds. Any spraying speed within the prescribed ranges is automatically obtained and maintained by the controlled power unit, an integral part of the gun. Air pressure fluctuations do not affect its operating efficiency.

The Type 3E is equipped with a universal gas head, which allows the tool to be operated on any commercial gas, in conjunction with oxygen and compressed air. A duplex mounting fixture is provided for permanent installation on the production set-up.

Metco Type E or 2E guns may be converted to Type 3E. Or, should the demand arise at a later date, the Type



Metco Type 3E Metallizing Gun

3E may then be converted back to the standard Type E or 2E.

Typical applications include the spraying of corrosion-resistant coatings on iron and steel structures and equipment; water- and chemical-resistant linings for storage tanks and degreasers; conductive and soldering surfaces on glass, plastics and carbon products.

Sterling R-851 Insulating Varnish

The latest achievement of The Sterling Varnish Company, 168 Ohio River Blvd., Haysville (suburban Pittsburgh), Pa., is the development of R-851, a flexible insulating varnish. It is designed for applications that demand great lead wire flexibility in addition to high mechanical strength. R-851 is said to show so little progressive hardening when the dried film is exposed to the air that it is recommended for coating armature and stator coils that will be stored for long periods before assembly.

This clear baking varnish dries com-

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—as a surface tension lowering agent

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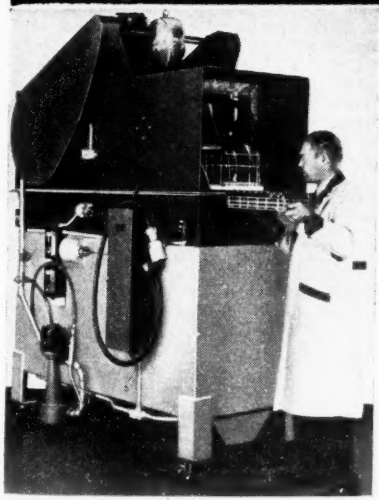
Improved Vapor Degreasing



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Contains specific information on degreasing problems, solvents, solvent toxicity and control, solvent recovery, and many practical applications.

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pletely throughout when baked at a temperature of 135 deg. C. The dried insulation is oilproof and affords a protection that is said to be exceptionally water, acid and alkali resistant. It is recommended by the manufacturer for electrical equipment wound with glass-covered wire designed to operate at exceptionally high operating temperatures.

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to take responsibility for chemical phases of design and manufacture in well-known, medium size radio parts plant. Principal work on "plastics" with some on surface finishes, corrosion inhibition and adhesives. Present work on very high priority war development and manufacturing projects. Post-war prospects excellent since we have no war inflated organization to deflate. Write qualifications, experience, draft status and availability to Eng. Dept., Jensen Radio Mfg. Co., 6601 S. Laramie Ave., Chicago 38, Illinois.

Divine Polishing and Buffing Equipment. A convenient file-size catalog covering the polishing and buffing wheels, supplies and machinery manufactured by Divine Brothers Company, Utica, N. Y., has been prepared. Indexed dividers make it easy to locate the desired information quickly. The following sections are included: buffs, polishing wheels, glue systems and machinery. Illustrations and specifications of the various items are given. Copy of the catalog free upon request.

Udylite Fully Automatic Plating Machine is the subject of a four-page folder available from The Udylite Corporation, 1651 E. Grand Blvd., Detroit 11, Mich. The folder is well illustrated with views of this "packaged," fully automatic, compact, versatile plating unit. Specifications are given. Copy free upon request.

LaMotte Control Handbook. Celebrating its 25th anniversary, the LaMotte Chemical Products Co., Towson 4, Baltimore, Md., presents an 84-page edition of its handbook, "The ABC of pH Control." The manual has been revised and enlarged in this, its 12th, edition to become the most comprehensive handbook yet published by LaMotte.

Its up-to-the-minute information and general catalog section describing the full line of LaMotte equipment and chemical reagents should prove of value to those interested in the process industries. Copy free upon request.

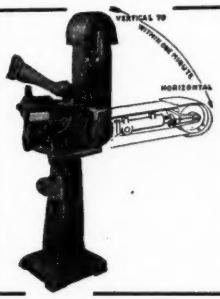
"Sharpshooting at Flames" is the title of a fire protection handbook that graphically explains and illustrates the latest techniques in fighting fires with fast-action carbon dioxide. This handy booklet, R-5827, describes the physical characteristics of carbon dioxide gas (CO_2), the arrangement and distribution of the fire extinguishers, and the organization of the plant fire-fighting system. Photographs also illustrate approved methods of quickly extinguishing flammable liquid and other dangerous industrial-type fires.

Copies may be obtained without charge from Randolph Laboratories, Inc., 8 E. Kinzie St., Chicago 11, Illinois.

Jar Mills. The line of standard and roller type jar mills manufactured by The U. S. Stoneware Co., Akron, Ohio, is described in Bulletin No. 255. Jar mills are used to grind and pulverize pigments, chemicals, and similar materials. Specifications are included. Copy free upon request.

Elliott Infra-Red Ovens. Features of the fully-enclosed type of infra-red ovens designed and constructed by The Elliott Electric Company, 2186 W. 25th St., Cleveland, Ohio, are outlined in a four-page bulletin designated as No. 501. Special characteristics of the ovens include variable watt density, positive exhaust, air stratification and lateral adjustment to control product temperature and to simplify maintenance. Copy free upon request.

Acme Full Vision All Purpose Gas Masks. Acme Protection Equipment Co., 3618 Liberty Ave., Pittsburgh, Pa., is now issuing Folder No. 203 to provide detailed information on the "Full Vision" gas masks which it manufactures. Illustrations and specifications are included. Copy free upon request.



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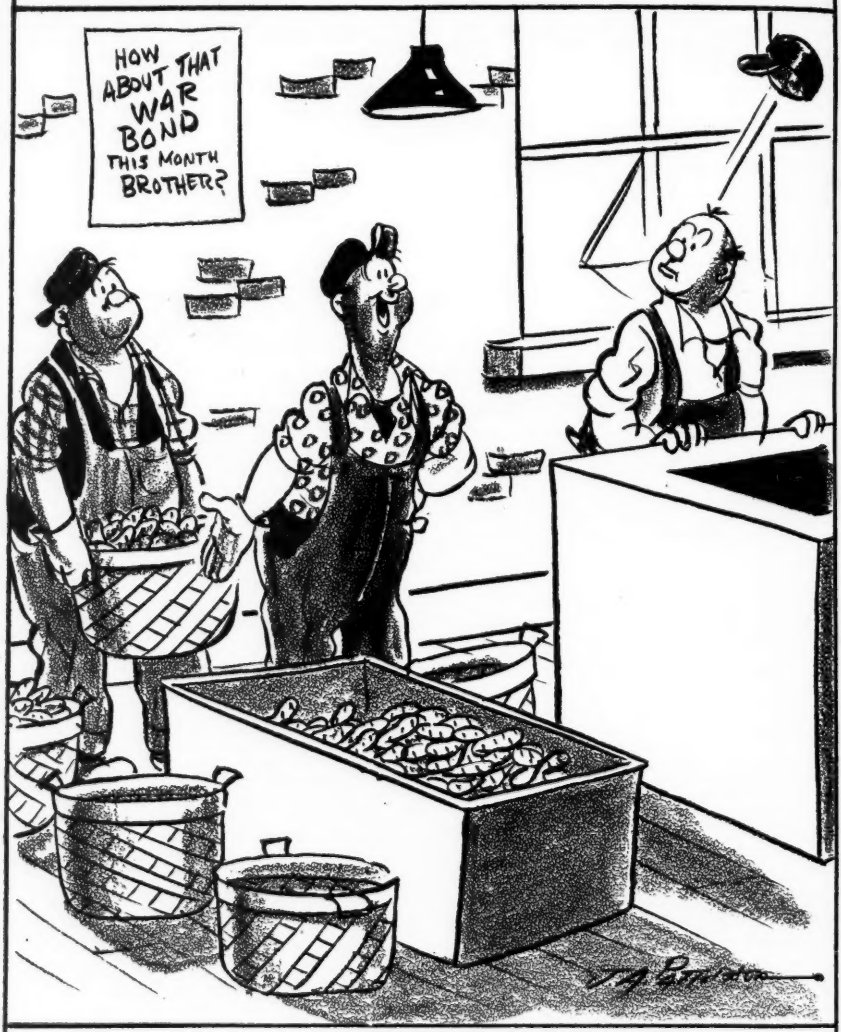
SPARKLER HORIZONTAL PLATE FILTERS

The Finishing Touch — **J. A. Patterson**



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